Fall 1980 Vol. 2 No. 2 $2.50 in USA
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GUIDE TO PERSONAL COMPUTING

onComputing™

14151

Software in the 80's

Reviews: Texas Instruments 99/4, Text Formatters, Comprint 912 Printer, WpDaisy

Computers in the Schools: East and West

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Fall 1980 onComputing Volume 2 Number 2

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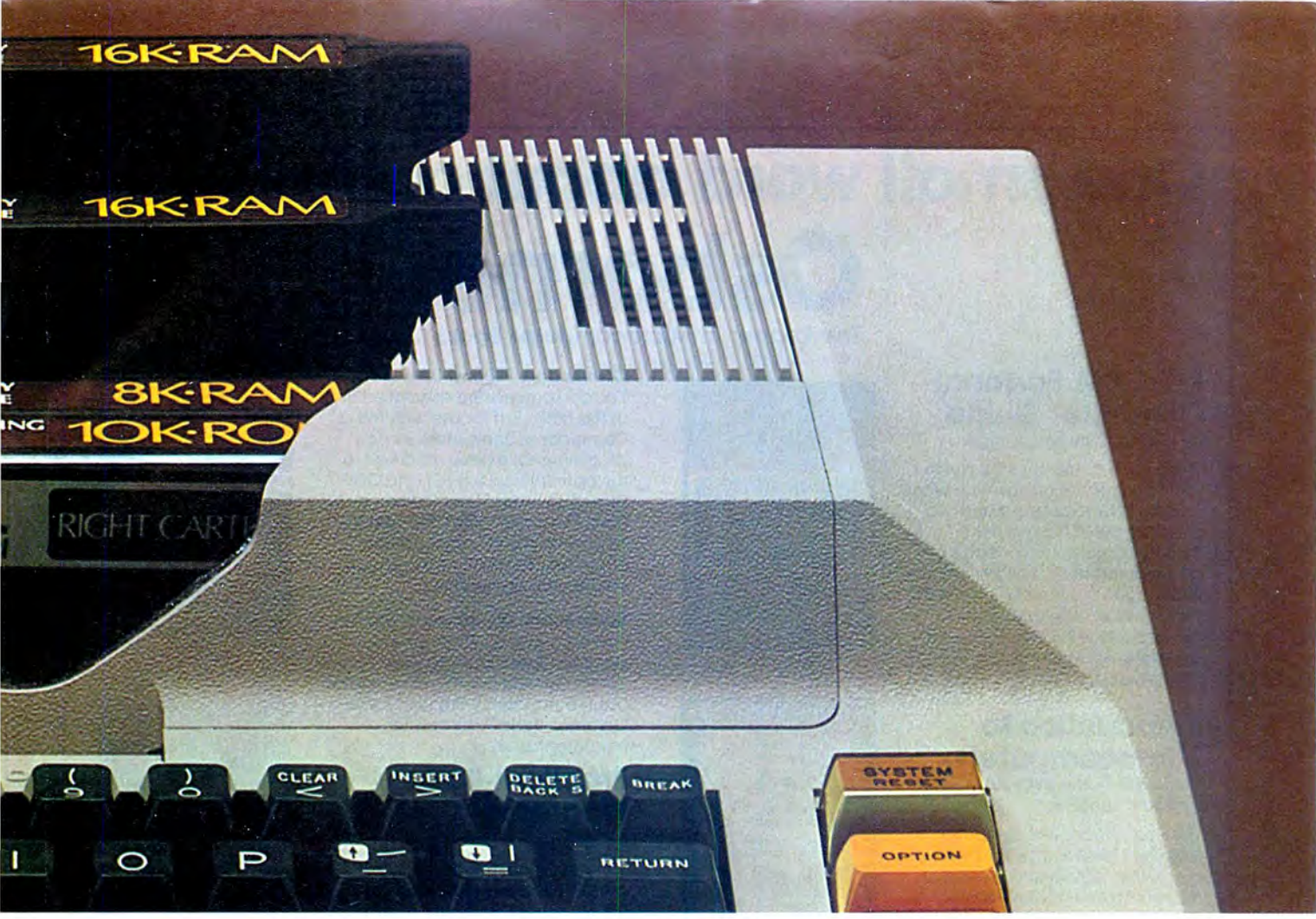

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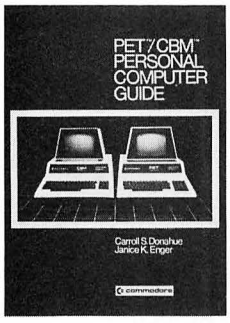
by C. Donahue and J. Enger

This book is a step-by-step guide for the computer novice who wants to learn how to operate and program the PET computer. Assuming no prior knowledge of computers, this PET Guide contains information on all areas of interest ranging from how to push the buttons on the tape cassette unit to a detailed description of PET memory contents.

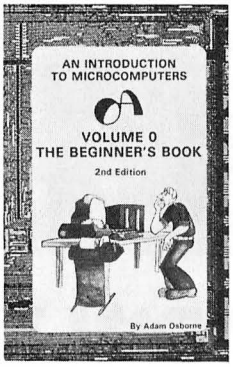


Introduction to Microcomputers

Volume O — The Beginner's Book

by Adam Osborne

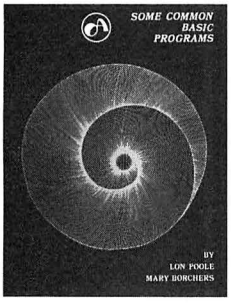
This book introduces computer logic and terminology to the complete beginner in the field of microcomputers. Numerous illustrations and photographs combine with clear, easy-to-follow text to provide an elementary but broad-based background.



Some Common BASIC Programs

By L. Poole and M. Borchers

This book was designed for people who can use a variety of practical BASIC programs — 76 programs in all — that cover a wide variety of personal finance, math, statistics, and general interest topics. The documentation in the book is complete so that you can run the programs even if you aren't an experienced programmer.



Commodore PET and CBM users. You can purchase a special edition of this book, just for use with the Commodore computers. All 76 programs have been modified to run optimally on the PET and CBM. Be sure to order Some Common Basic Programs - **PET/CBM Edition**. To go with the PET/CBM edition, order the programs ready-to-run on cassette or diskette.

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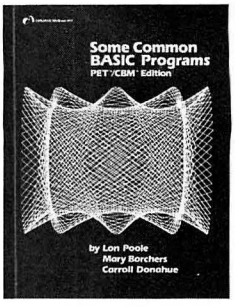
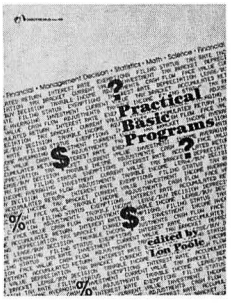


Practical Basic Programs

edited by Lon Poole

Just published, this collection of 40 programs covers slightly more sophisticated applications than Some Common Basic Programs. There are extra practice problems, with answers, to help you fully understand what these programs can do. Program titles include Income Averaging, Lease/Buy Decision, Syndicated Investment Analysis, Home Budgeting, Critical Path Method, Nonlinear Breakeven Analysis, Statistical Estimation Theory, and Lagrangian Interpolation.



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Cover Photo by Frank Wing of Stock Boston.

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Vol. 2 No. 2. Fall 1980

onComputing is published four times a year by onComputing Inc, 70 Main St, Peterborough NH 03458, a wholly-owned subsidiary of McGraw-Hill, Inc. Address all mail except subscriptions to above address: phone (603) 924-9281. Address all subscriptions, change of address, USPS Form 3579, and fulfillment questions to onComputing, POB 307, Martinsville NJ 08836. Controlled circulation pending, Waseca MN 56093 and Peterborough, NH 03458. (ISSN 0194-8075) Subscriptions are $8.50 for one year in USA and its possessions. In Canada and Mexico $10 for one year. Other foreign countries $12 for one year surface delivery. Single copy price is $2.50 in the USA and its possessions, $2.90 in Canada and Mexico, $4 in Europe, and $4.50 elsewhere. Foreign subscriptions and sales should be remitted in United States funds drawn on a US bank. Printed in the United States of America. **Subscription WATS Line (800) 258-5485**

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Editor's Message

Texas Instruments and the Media

Texas Instruments has come under some criticism lately in the technical and business press, to the effect that they don't understand the consumer market, that they've made some very expensive mistakes—even that they're incapable of making a good personal computer. I find these allegations distressing, especially when I look at the many innovative products that TI has consistently turned out. The Speak & Spell learning machine is one of the major electronic advances of the last ten years. A computer-controlled talking module for $60 is an incredible achievement. In fact, there *is* no comparable product on the market (except for TI's own talking Language Translator). The reason is that no one else has been able to match TI's ability to take sophisticated research and development work and mass-produce it inexpensively.

What about the Model 99/4 personal computer? Several critics have taken it to task for not being the dream machine they were expecting. You can't program it in assembly language, the BASIC is too slow, and so on. But for many of the applications for which it was designed, it works well.

Not too many personal computers on the market today are still in their original configurations—the Apple I, for instance, or the original Commodore PET. Even the TRS-80 will by all indications go through an inevitable transformation. And ultimately the 99/4 will go through a series of design changes, too.

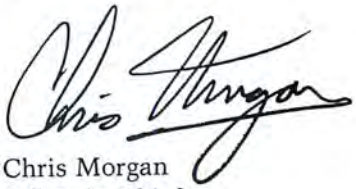
My point is not that we in the media should avoid making constructive criticism (see my review of the 99/4 in this issue.) But we should refrain from the kind of destructive criticism that says that a company doesn't understand the market. (For what it's worth, many personal-computer company executives have said privately that they're unsure of this volatile, quicksilver business.)

In the area of educational software, Texas Instruments is doing some exciting and admirable work with MIT's Seymour Papert, who has developed a special computer language for children called LOGO. TI is supplying the Lamplighter Elementary School in Dallas with specially modified 99/4s containing LOGO. If the project is successful, the package will be marketed commercially. Having seen LOGO in action, I sincerely hope the company will make this innovative language available.

I for one am glad that a company as creative as Texas Instruments is in the personal-computing market. They need to be encouraged to stay in our field and to continue their important development work. Like any other contender, their ultimate success *will* hinge to a certain extent on their ability to second-guess the marketplace.

But once they hit their pace, nothing in this industry will be the same again.■

PS: In a recent issue of BYTE, *we mentioned that we would be reviewing the new Apple News and Quotes Reporter program. Because of space limitations, however, it will appear in the next issue.*



Chris Morgan
Editor-in-Chief

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Letters Letters

Word Processing

Dear Editor:

Bless you all, Chris!

The word-processing articles in your Summer 1980 issue of onComputing are superb, and will help me and many others to choose and buy a system! This issue is worth five years' subscription fees for me.

(I'm a management consultant; in my job, I work on marketing problems for small manufacturing companies.)

Rodman A Sharp
Santa Fe NM

This letter was written in red ink across the Editor's Message page torn out of a copy of the Summer 1980 issue of onComputing. Mr Sharp is obviously a very busy but vocal reader. We appreciate his kind words. . . . **CM**

There Are Word Processors for the Apple, Too

Dear Editor:

We have greatly enjoyed your magazine. The Summer 1980 issue is particularly fine; the articles on word processing are concise and illuminating.

We were particularly impressed with the article "A Writer Looks at Word Processors" by Dr Jerry Pournelle, who scored a direct hit when he said that a microcomputer offers much more versatility and utility than a dedicated word-processing system.

We also agree with Dr Pournelle's evaluation of available word-processing programs, particularly that a number of such programs presently on the market are much less than desirable from the user's standpoint.

The article was so good, in fact, that we are distressed that we didn't release our word-processing program for the Apple II series of computers in time for Dr Pournelle to use it.

Dr Pournelle stated that the Apple could not compete with Z80 and 8080 systems. The Apple has many excellent features that have not been utilized to their fullest extent. Most significantly for text editing, the Apple with its 6502 processor has the capability of memory-mapped text display and can do it just as well as any other type of microprocessor, including the Z80 or 8080 processor.

Our recently released Datacope Scribe brings word-processing capabilities to the Apple that are at least as powerful as those of the best programs on the market and is in many ways easier to use.

Datacope Scribe is character-oriented and uses a memory-mapped text display. In addition, Datacope Scribe was written with the user in mind. All controls and commands are mnemonics designed to be easy to learn, remember, and use.

The Datacope Scribe requires only a lowercase adapter, a 48 K-byte Apple II, a Disk II, and a printer with interface. It does not require a Microsoft Z80 SoftCard or a separate terminal.

Admittedly, most of the word-processing software available for the Apple is of limited value to the serious user. We feel that we have overcome this problem.

Larry Phillips
Datacope
Little Rock AR

Positive Feedback

Dear Editor:

I wish to commend your Summer 1980 issue for being the best yet. We find your publication to be the best available to teach us how to use the machines on a practical basis. Many thanks.

Mark Finley
Austin TX

Hard Disk Flops

Dear Editor:

I have noticed an apparent error on page 15 of the Summer 1980 issue of onComputing.

I believe photo 3 displays a picture of an 8-inch hard-disk drive; the caption calls it "an 8-inch floppy-disk drive."

However, the mix-up did not distract from the fine article by Pamela Valentine.

John R Stenzel
Kansas City MO

Despite our best intentions, mix-ups occasionally occur in photo captions. Our thanks to Mr Stenzel (and several other readers) for spotting this obvious error. . . . **CM**

Should Microcomputers Be Rentable?

Dear Editor:

I've been thinking for over two years about getting a microcomputer system. It's likely to be another couple of years, at least, before I do get one.

A year ago I had over $2000 allocated for a system. I now have at least $4000. I have read dozens of magazine issues, including yours, and several books on microcomputers and BASIC programming. I'm still not ready to buy. In fact, what is keeping me from buying is the present state of the computer-selling art.

I am not going to buy unless I can first *rent* and try out different combinations—until I am satisfied that I've got what I want, not what I *think* I've got.

For example, I have a TI-59 calculator and printer. While it is an amazing and exceedingly useful machine, it does not do some things I thought it would, and/or in the ways I thought it would. I only found out those things *after* I bought it.

A microcomputer system is several times as complex. To buy one thinking that one will get what he thinks he will be getting does not follow. I, for one, am not going to buy a "pig in a poke."

I want to rent an ABC computer, try it out, and see how it runs with my application. Maybe the DEF computer with a different version of BASIC would be more suitable; maybe a different operating system. Different or additional memory may be required. Do I like the GHI or the JKL monitor? The MNO or the PQR printer?

If I had $10,000 or $20,000 to plunk down, I could probably get something big enough and flexible enough to adapt to what I need, but who knows?

I can rent cars, land cruisers, boats, airplanes, TVs, and video recorders for a day, a week, a month, or whatever. Why can't I rent computer components until I put together—at my convenience—the system that fills my needs? *Then* buy.

David A Bean
Santa Monica CA

Writing Your Own Program

Dear Editor:

I have read with great interest your article "Use Your Pocket Calculator to Save Money" in the Winter 1979 issue of onComputing. This involves the use of a TI-59 calculator with its printer.

I note that it is necessary to write a program to obtain the grouping of expense accounts. As a result of your article, I would assume that TI would be interested in making available such a program. I do not feel that I am capable of doing so myself. Do you know if TI has any plans or intention of producing such a program? If they did, I would probably purchase one of these combinations.

Second question: Will this combination print a list of the check numbers and amounts stored in each category, so that it would be possible to know how the totals were arrived at?

I am just starting to get involved in computers, and I find your articles very helpful.

A Sanford Kellogg
Cos Cob CT

We know of no such program, although the program given in figure 6 of the article accomplishes the process described in the article and is written for a TI-59. A program that breaks down each category by the checks that contribute to its total is more suitable

for a microcomputer than for a pocket calculator; such a program would require much more memory than is available in even the most sophisticated pocket calculator made today, with the possible exception of the Hewlett-Packard HP-41C. If you are interested in having specific applications programmed, you have two choices. First, try to find help at a nearby computer club. Computer clubs are almost always friendly to newcomers, and there are usually a few people who have programmable pocket calculators. Second, you can try to write a program yourself; Texas Instruments supplies an excellent book on programming for the beginner with each TI-59, and it's not as difficult as you might think. . . . **CM**

Is APL Available?

Dear Editor:

I have enjoyed your first year of publication and look forward to further issues. As a "software person" rather than a "hardware hacker," this magazine meets my interests, particularly the product reviews.

A particular point of interest to me would be to find an appliance computer with the APL language implemented, at a reasonable price. This is especially difficult because of the special character set which makes many terminals, keyboards, and printers ineligible. From time to time, newspieces or advertisements suggest that some software house or manufacturer is about to introduce an APL interpreter, but nothing ever seems to come of it.

With memory costs substantially reduced and the new generation of 16-bit microprocessors coming into volume production, surely somebody will produce a moderately priced, working APL computer. If they do, how will I hear of it or distinguish it from a possible host of inferior competitors unless the computer publications review them? Furthermore, hardware and software developers will be more inclined to work on APL equipment if they know they will have an audience and a market when they are done.

I understand the need for BASIC as the first language implemented after machine language because of the limitations of those early machines. I also applaud the development of Pascal for system programming or compiler type of work. For someone interested in ready manipulation of numbers however, APL has to be the language of choice by a country mile. It is outstandingly convenient to use.

Any hope?

R S Lumsden
Willowdale Ontario

Yes, there is. APL is available for some microcomputers, though, with one exception, it is not yet inexpensive. It may be a long time before a version of APL like the kind found on larger computers will be available for microcomputers. Not only does the special character set necessitate special hardware, thus increasing the price of such a system, but it seems to be nearly impossible to get a full version of APL into the 64 K-byte system (which is the most memory an 8-bit microcomputer can address).

Still, I know of three vendors of APL systems. The Software Exchange (POB 68, Milford NH 03055) has an impressive subset of APL for the Radio Shack TRS-80 computer; the program, called APL-80, is $14.95 on cassette and $39.95 on disk. Softronics (36 Homestead Ln, Roosevelt NJ 08555) offers a version of APL that runs on any computer having the CP/M operating system. Vanguard Systems Corp (6812 San Pedro, San Antonio TX 78216) offers a fuller version of APL for a CP/M machine for $500. Vanguard also offers a custom APL computer that uses the standard APL character set for around $8000. These three products will be reviewed in an upcoming issue of BYTE *magazine. . . .* **CM**

DMA Vs Memory-Mapped

Dear Editor:

I read with interest the article by Jerry Pournelle discussing word processing on personal com-

puters. I was in general pleased with the article, but I found one glaring error that should be rectified, namely the definition of DMA, or direct memory access.

Dr Pournelle describes memory-mapped video, in which the video display is actually a segment of programmable memory, and chooses to call this DMA. In fact, DMA, or direct memory access, is a process that allows direct movement of data between a peripheral device (for example, a disk drive) and memory without the intervention of the microprocessor.

Charles H Strom
New York NY

Mr Strom is absolutely right. The term DMA *is often misused in the industry, and we unfortunately fell into the trap. On another matter related to this article, Steve Ciarcia pointed out to me that some terminal-based systems can be made to work as fast as memory-mapped displays by using parallel instead of serial data transmission. See page 59 for an error message about this article. . . .***CM**

No More VideoBrain?

Dear Editor:

The occurrence of two articles in your Spring 1980 issue ("The APF Imagination Machine" and "The Atari 800 Personal Computer") suggests to me that someone on your staff may be able to help me with a problem. I note from the former article that the APF has "a ROM-PAC slot . . . . like the Atari 400," but no further mention of this feature; this, however, is what drew my attention to both articles. (The Atari article has more on this subject.)

Not very long ago, because of an attractive offer by a vendor, combined with a misunderstanding on my part, I purchased a "VideoBrain" computer, which also uses program cartridges like those used by the APF and Atari computers. To my chagrin, however, it appears that the manufacturer has ceased operation, and I have not been able to get schematics, diagrams, expansion units, or the APL/S cartridge to allow more general use. I have thought several times that the facilities and perhaps personnel of VideoBrain might have been acquired by somebody, but I have no idea who this might be or even if it happened. Now I am wondering if APF or Atari might have acquired the former VideoBrain (or indeed, if Exidy might have done so, since the Atari article indicates that Exidy also uses plug-in cartridges.)

Does somebody at onComputing know what became of VideoBrain? Or, if it simply went out of business, is there any place that I can turn for information, supplies, advice, etc? My principal concern at first would be for schematics and the APL/S cartridge. Other than that, I would appreciate anything that is helpful in connection with the machine.

William C Schumacher
1724 Lark Ln, Willowdale
Cherry Hill NJ 08003

To the best of our knowledge, the VideoBrain Computer Company did go out of business with no other company picking up their product. This is why the VideoBrain computer you bought was sold at such a low price—the same computer had been sold with cartridges available at a somewhat higher price until the supply of cartridges ran out. The Exidy, APF, Atari, and Texas Instruments computers all use program cartridges containing read-only memory, but they are in no way compatible. Your best bet for cartridges is to find a dealer who still has a few. Anyone having information on either cartridges or schematics is asked to write to Mr Schumacher at the above address.

The APL/S language, offered with the VideoBrain computer, is sort of a hybrid of APL and Pascal. It was described in a Languages Forum article "APL/S: An Alternative" by Robert G Brown in the December 1979 BYTE, *pages 88 thru 99. . . .* **CM** ■

onEducation

The Lawrence Hall of Science

Teaching Personal Computing in the Hills of Berkeley

by Chris Morgan

Fifteen Apples, thirty Commodore PETs, and twenty Atari 800 personal computers.

It's the kind of computer power most schools dream of, but at the Lawrence Hall of Science in Berkeley, California, it's business as usual.

Thousands of students (grades K thru 12) and teachers come each year to the Lawrence Hall—a nonprofit learning center affiliated with the University of California—to get hands-on experience with personal computers, and to admire its striking architecture and commanding view of San Francisco Bay.

Namesake of Ernest Lawrence (1901-1958), the Nobel Laureate inventor of the cyclotron after whom element 103 (Lawrencium) is named, the Lawrence Hall of Science is a complete science museum with exhibits and study programs covering the spectrum of biology, physical sciences, and mathematics, as well as computers.

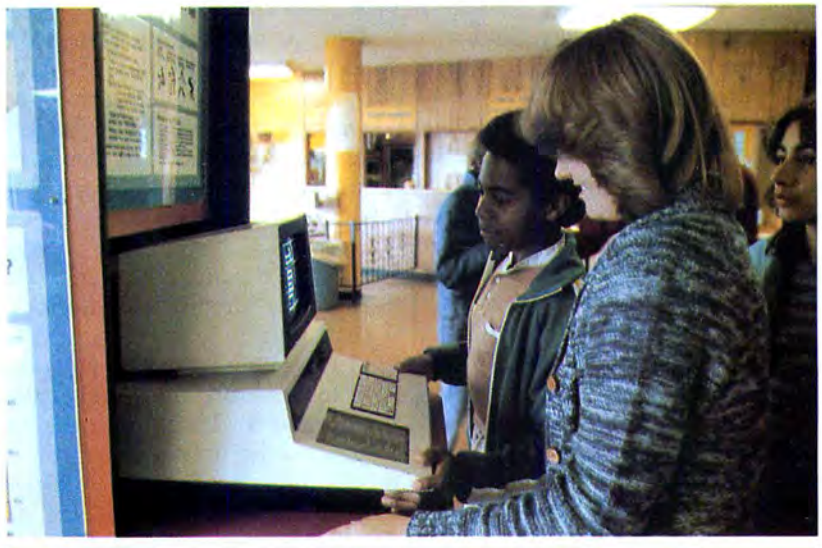
At left: *The Lawrence Hall of Science's striking architecture overlooking San Francisco Bay from the Berkeley hills.*

Inset: *A typical computer session at the Lawrence Hall reveals the excitement in the air. Here the day's lesson involves individual programming on Apple computers.*

Computerized Nutritional and Life Span Analyses

In fact, computers are everywhere at the Lawrence Hall. During a recent visit there, I stopped in the cafeteria for a quick snack, only to find a Commodore PET computer surrounded by a dozen sixth graders having their lunches nutritionally analyzed by a program developed at the Hall. To use it, you simply enter a description of everything you had for lunch, and the computer obligingly displays the amounts of vitamins, minerals, protein, carbohydrates, fat, and calories in your meal. I hesitate to reveal my caloric total.

Back upstairs, I tried my hand at a variety of computer games on the timesharing terminals, then proceeded to an Apple computer that is part of an exhibit sponsored by the American Cancer Society. Here I was quizzed about the amount of exercise I did every day, how much I ate, whether I smoked, and if so, how much. After a thorough interrogation, the computer announced my expected life span based on statistical tables developed by the Cancer Society. This type of personalized approach to health education is dramatically effective. The Lawrence Hall is planning to send a traveling exhibit about



cancer around the state, complete with a personal computer.

The many classrooms at the Hall serve as the hub of its almost endless stream of daily activity. If students can't attend classes for any reason, the Hall will send computers to them! Three times a week, a van equipped with twelve Apple computers leaves for points near and far in the state, preaching the computer "gospel."

Actually, there were computers at the Lawrence Hall long before personal computers appeared on the scene. Seven years ago, the computer program began with a timeshared minicomputer system whereby computer time could be leased to schools via telephone lines. Ironically, the Hall has since lost many of its time-sharing customers because the schools are equipping themselves with individual microcomputers. As a result, the timesharing system is being converted into a word-processing system to handle the increasing amount of paperwork at the center.

I spent an afternoon this past spring talking with Arthur Luehrmann, Director of Computer Research at the Lawrence Hall. Luehrmann is a dynamic polymath, equally at home in the areas of physics, chemistry, and

At left top: *Inside the science exhibit hall at the Lawrence Hall of Science.*

Center: *Are you eating the right foods? Kids at the Lawrence Hall can find out with this clever nutrition program located in the cafeteria. You type in what you had for lunch, and the Commodore PET computer gives you a complete analysis of vitamins, minerals, and calories.*

Bottom: *Playing games on the timeshare terminals.*

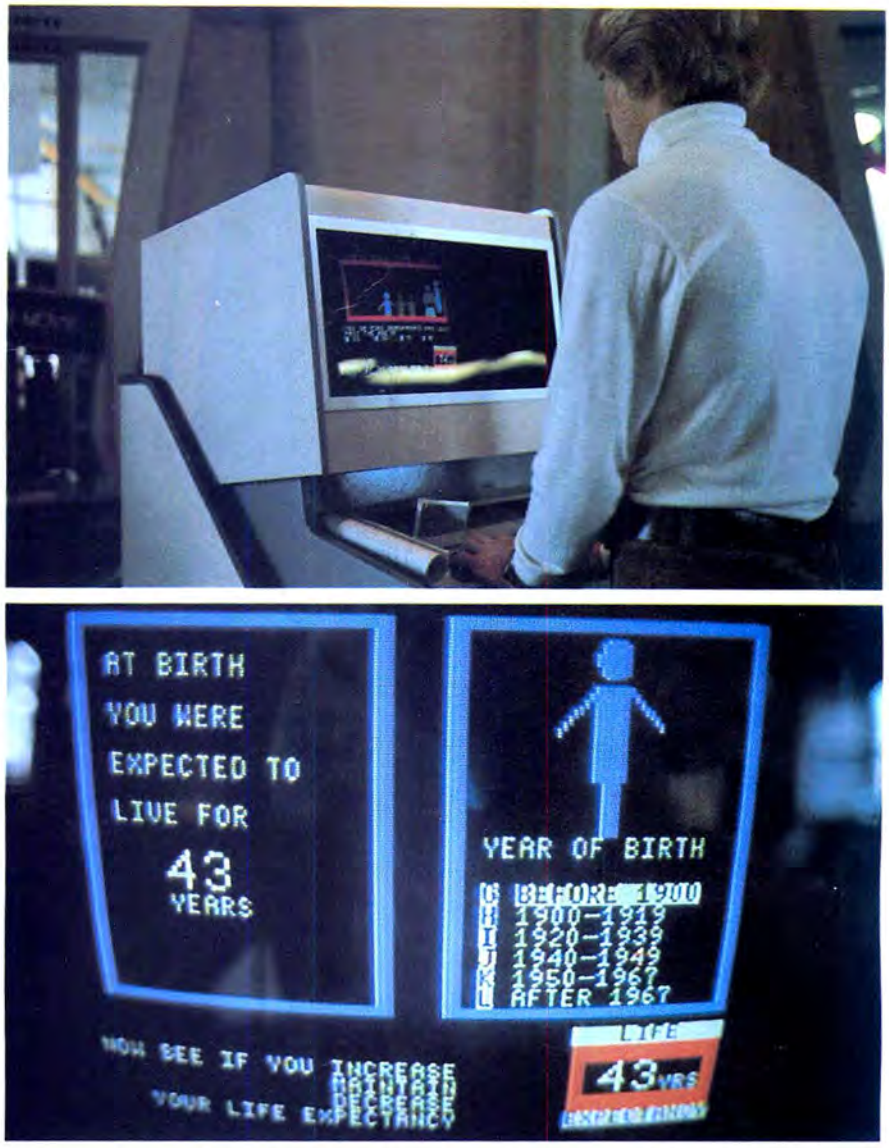
computer science. His multiple interests are reflected in the diversity and quality of the Hall's computer course offerings—there are over eighty different computer classes in the summer alone, filled well in advance by eager students and teachers from all over the state. California has traditionally led the way in introducing personal computers into secondary schools, due in large part to the Lawrence Hall's support of the exploding personal-computer field.

Thousands of students and teachers annually flock to the Lawrence Hall for hands-on personal computer experience.

How did Arthur Luehrmann, a physicist, get interested in computers in education? As it turns out, he was first exposed to computers while working on his thesis as a graduate student at the University of Chicago. "I realized that students and computers made a nice team together," he said. "I became more interested in the student-computer relationship than in physics, and I've been involved with it ever since."

Computerizing the Periodic Table

One of Luehrmann's major projects of late is designing microcomputer-controlled museum exhibits. The computer is used for two purposes:



Above: *This American Cancer Society-sponsored computer exhibit calculates your estimated life expectancy based on information you type in.*

- to control and run the exhibit
- to carry on a dialog with the visitor, offering a variety of activities

"The trick," as Luehrmann points out, "is to make sure that the computer acts only as an agent in the process, and does not dominate the exhibit."

A case in point involves the refurbishing of an older exhibit at the Hall—a huge (12 by 20 foot!) display case representing the periodic table of the elements. In the table's original incarnation,

each element could be lit from the rear by a control panel operated by a lecturer. Several interesting effects could be obtained in the course of the lecture. For instance, all the gases could be lit, or all the metals, and so on. The problem was that everything hinged on the lecturer. If the lecturer was not available, or if he or she did not want to give the same lecture over and over, the exhibit would lie dormant.

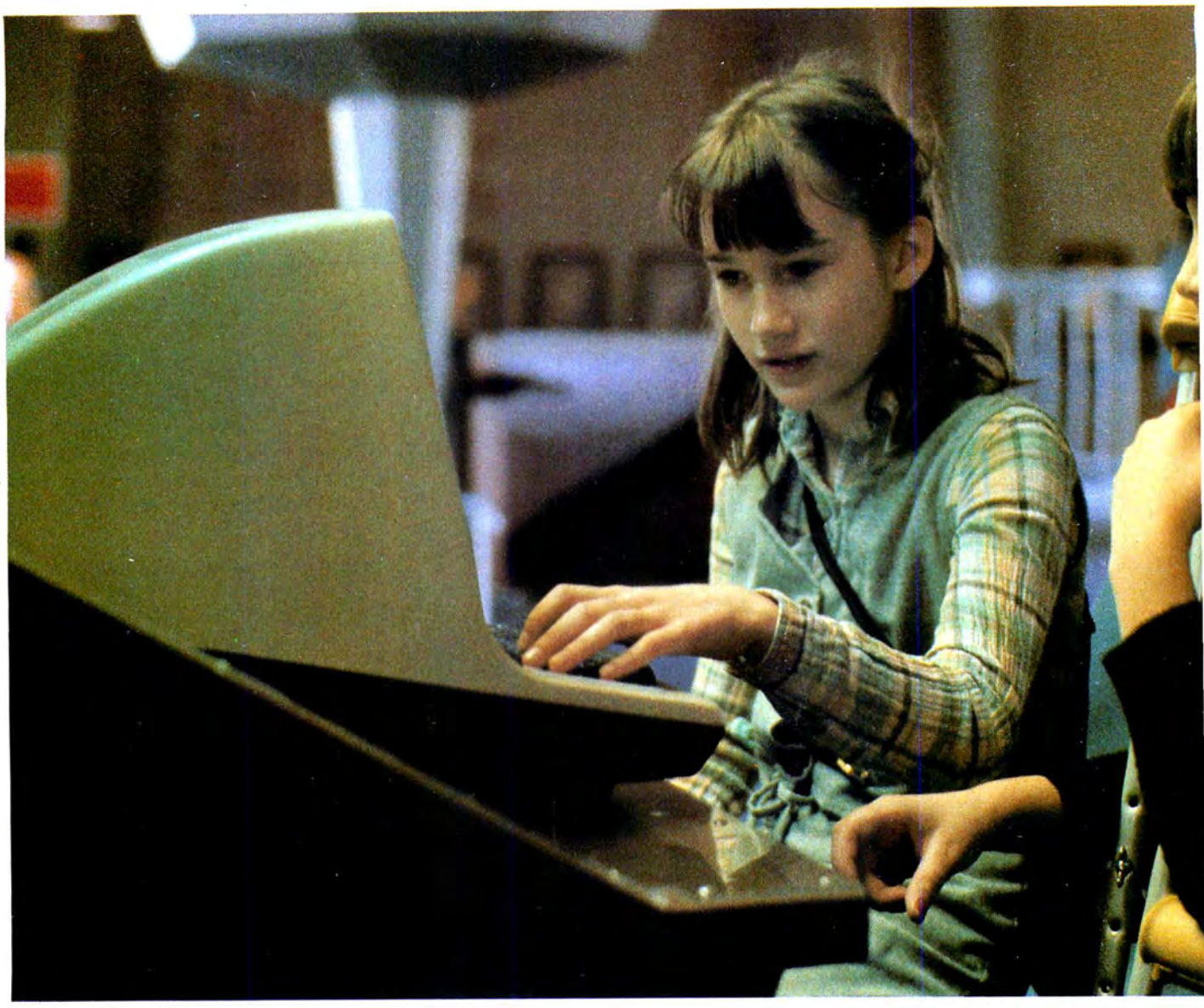
Later, another attempt was made to use a videotape of the lecture that could automatically cue the various lights on the display. Again, this was not effective. Why? "The real reason is that the viewers were not actively participating in the action," said Luehrmann. "So we added a microcomputer to the display,

and gave the viewers a chance to get involved." Now a visitor looks at the video screen and is given a choice of up to a dozen activities (the rest of the viewers can "kibitz" while watching the same output on another large color video screen overhead). The viewer can choose a game called "What's In?," in which case the computer asks, "What's in air?" or "What's in a rock?" The appropriate elements present in the substance are then flashed on the large display.

Another game is "Which Ones Are?" Here you're asked to identify all the heavy metals, or all the radioactive metals, etc. Yet another activity—by far the most spectacular—is called "Heat Up." In this simulation, the computer begins with the entire universe at absolute zero temperature. Slowly, the temperature displayed on the video screen rises until some of the elements start to melt. Whenever an element melts, its light goes on. When an element starts to gasify, its light begins blinking, until eventually all the lights are blinking like a huge Christmas tree.

Above and left: *The intensity level goes up even when you're playing games.*

Such a display of pyrotechnics is sure to grab the attention of even the most blasé museum-goer. "The periodic table is not just a conventional list," says Luehrmann. "It has structure. We don't want to teach structure; we want people to discover it for



At right: *The entire family gets into the act.*
Far right: *The Lawrence Hall's computer shuttle brings personal computers to children around the state who cannot visit in person.*

At left: *Even broken ankles don't keep fledgling programmers home.*

themselves. One way to do that is to create an interactive exhibit that asks you questions."

The major philosophy of the Lawrence Hall's computer center is twofold. On one hand, the study of computers—or computing—is valid, and will become increasingly more important as our society becomes more dependent on computers. On the other hand, the use of computers as tools to teach other disciplines is equally valid.

I sat in on a typical computer class, consisting of twelve sixth-graders. The goal of the class was to teach the students how to calculate a mathematical average, in this case, the average height of the class. Several interesting techniques were used simultaneously to get the instructional points across. First, an accurate measurement of each student's height was made (thus illustrating the proper use of a ruler). The heights were then tabulated on the blackboard, and the concept of "average" explained. The students were asked to write programs in BASIC that would automatically calculate the average. By the end of the class, most of the students had succeeded in writing working programs, and in the process had learned many of the basic points of programming, including data handling and looping.

Computer Awareness

In an article called "Computer Illiteracy—A National Crisis and a Solution For It" (July 1980 *BYTE*, page 96), Arthur Luehrmann wrote:

> While computer *awareness* can be arrived at by means of books, lectures, films, and television shows, computer *literacy* can be reached only by practice. Therefore, if schools are to provide students with basic computer literacy, they must give each student many "laboratory hours" at the keyboard of an interactive computer system.

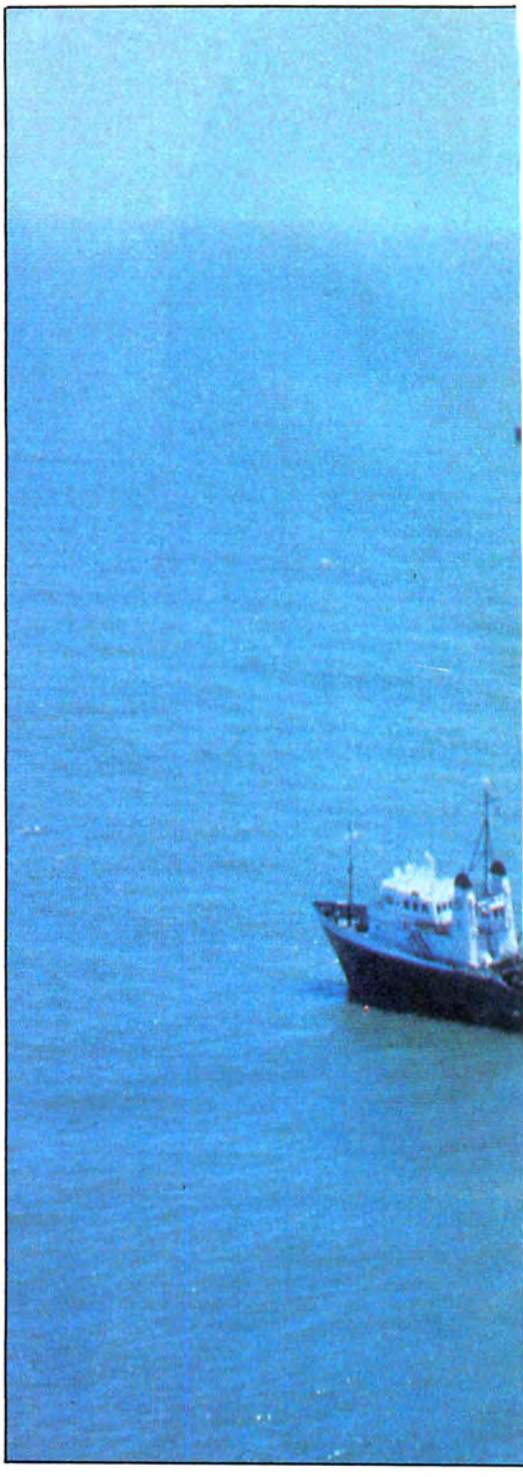
Arthur Luehrmann's hope is that someday the Lawrence Hall of Science will be just one of thousands of creative computer learning centers.

The Lawrence Hall of Science strikes me as being the best example in this country of what a true computer curriculum can be. It begins to approach the ideal situation imagined by MIT computer educator Seymour Papert. He hypothesizes a learning environment called "Mathland" in which the student learns the concepts of mathematics and logic easily and naturally because the framework of the classroom is designed with understanding and intellectual excitement in mind. Arthur Luehrmann's hope is that someday the Lawrence Hall of Science will be just one of thousands of creative computer learning centers around the world.

One thing is for sure: the kids attending the classes at the Lawrence Hall are counting on it.■

An Apple in the Oil Field

Computer Power Where You Need It



by Phil Roybal

After two years in the personal-computer business, I thought I had heard of most applications. But one that had not occurred to me is the automatic monitoring of an ocean-based oil rig. To understand this fascinating application, join me aboard a jet helicopter as we fly south of New Orleans, a hundred miles into the Gulf of Mexico.

The first thing that strikes us out here is the scale of things. We hover over a drilling platform (above) 700 feet long. Its derrick is taller than a ten-story building. And it supports a block and tackle as big as a Sherman tank. Now we land at this Occidental Petroleum drilling site. We are on Transworld 61, the largest semisubmersible oil rig in the world.

Size of the Job

Gasoline is expensive, in part because finding it is such a hard, dirty job. Roughnecks on this Louisiana rig work 12-hour shifts under the hot, southern sun in the slime and mud of the drilling floor. They wrestle with drill

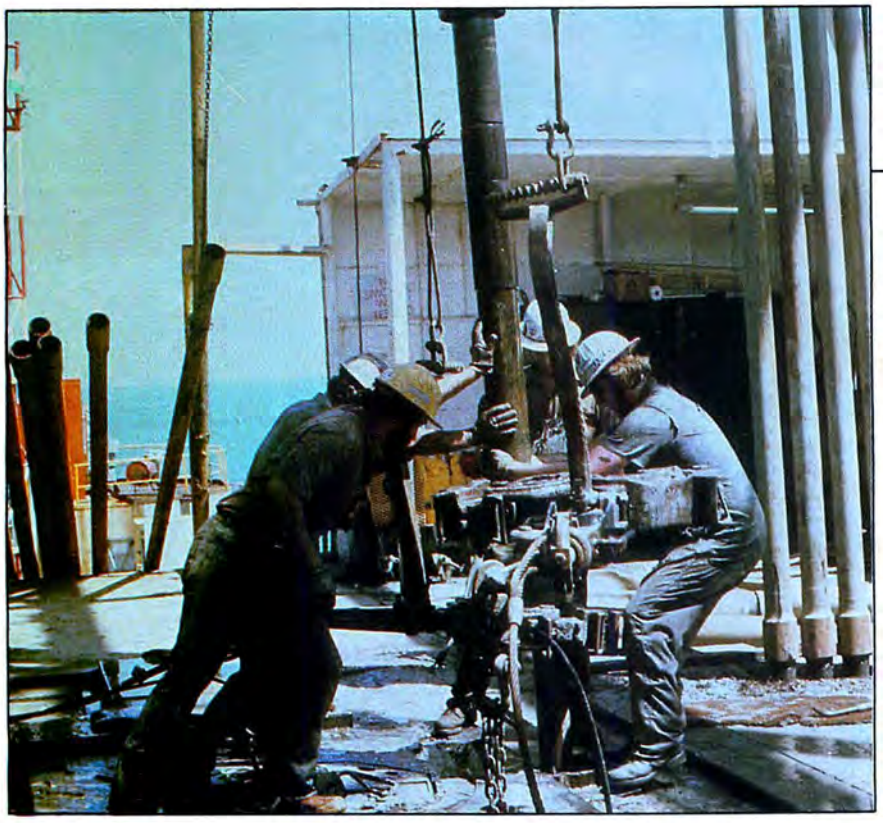


Photo 2: *The drilling floor is usually where the action is. These roughnecks are coupling on another 30 feet of drill pipe as the drilling progresses. The pipes weigh 3000 pounds each.*

pipes (photo 2) weighing 3000 pounds apiece, muscling them into position. They are tough people.

Drilling equipment is enormous. This rig supports 3.5 million pounds of drill pipe hanging down into the ocean floor. Giant pulleys make up a block and tackle system to raise and lower that pipe. Every day or two it must be pulled up to insert smaller drill heads and casings as the shaft goes further into the ocean floor.

Think of it. Three miles of pipe at 100 pounds per foot must be raised and lowered again and again. Time out here is worth $3000 an hour, and every hour spent pulling up pipe is an hour you do not spend drilling.

Dangers of the Job

Finally, drilling is a dangerous job. In photo 3 is shown a *Christmas tree*. This is the driller's life insurance. The Christmas tree sits on top of the well to prevent a *blowout* (an uncontrolled well eruption).

Picture those forces under the ground. Pressure 3 miles down is 10,000 thru 20,000 psi (pounds per square inch). That energy is contained by the weight of the mud in the drilling column: perhaps a million pounds or more. As a crew drills down into the ground, sometimes they will hit a high-pressure gas pocket. The column of mud containing the gas moves up and spills a little under this enormous force. Suddenly, instead of weighing a million pounds, it weighs only 900,000 pounds. Now it moves further up under the relentless pressure. Soon there is a bubble expanding up the shaft like the gas behind a rifle shell. It pushes rocks, mud, and water in front of it. When it clears the surface it threatens the environment, the rig, and the men who run it.

The Christmas tree is there to shut off that well. Usually it works. But sometimes it does not, and there is an undersea oil leak. A blowout. The only way to fix it is to start over someplace else, drilling down to relieve the pressure.

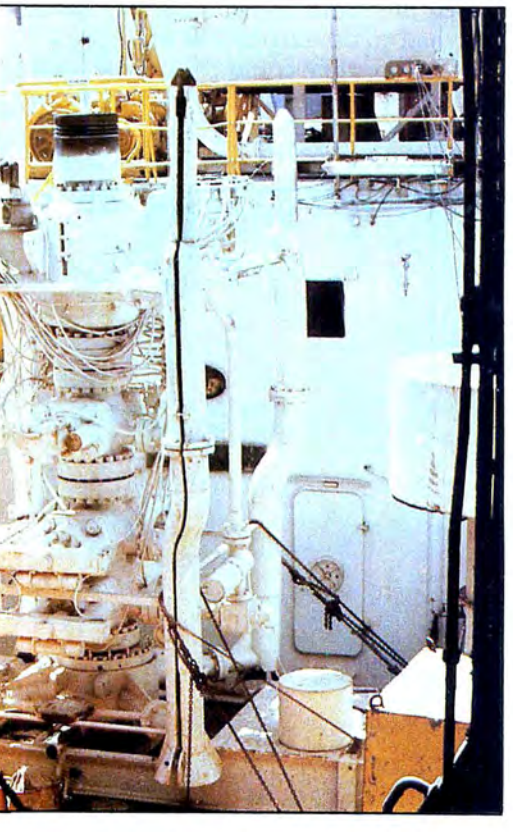
New Drilling Technology

Drillers use some old technology. Much of it dates back to the days of shallow wells and slow drilling. But today the wells

Photo 3: *A Christmas tree can prevent a blowout. This large structure is designed for undersea installation at the*

are 2 to 3 miles deep, and the drilling has to go rapidly to make them pay. So modern technology is replacing the old on the oil rig, making drilling faster and safer than ever before.

On many rigs in the Gulf of Mexico, there is a little blue trailer. This mobile laboratory monitors the action around and under the platform (photo 4). The instrumentation is produced by a company called Geotec of New Orleans, Louisiana. They are an Apple customer, and this is really their story. I was fortunate enough to visit the rig as their guest.



wellhead. Its job is to close the drill shaft in the event of a blowout.

Photo 4: *Geotec's trailer is the nerve center. This mobile laboratory houses both the computer and the analytical instruments which feed it. Information from throughout the rig flows into it.*

Personal Computer Monitors Drilling

Geotec has applied the power of personal computers to the task of collecting and analyzing drilling data. They started by placing instruments and sensors throughout the rig. Then they brought the information to a central point where the computer could evaluate it. The first thing they measured was mud.

Drillers use mud to power their drills and to flush the *chips* from the drill shaft. They pump the mud down at about 2800 psi, and it rotates a drill bit at the bottom. They use mud pumps as big as locomotive engines. Geotec outfitted the mud pumps with sensors (photo 5) that monitor flow rate, mud temperature, and density.

Photo 5: *These colossal mud pumps force mud into the shaft under great pressure to power the drilling tool. Geotec instruments monitor the mud flow.*

Next, the company equipped the computer to monitor drilling pressure. The force on the drilling tool is typically 25,000 to 100,000 pounds, and it is critical. Too much pressure will destroy the drill; too little pressure means the drill will not cut.

Geotec has applied the power of personal computers to the task of collecting and analyzing drilling data.

The driller must balance a million pounds of drill pipe to within a few thousand pounds. While he once had to do it manually with mechanical instruments, he now depends on a computer's tireless monitors to balance the load continuously and precisely.

There are also electronic eyes (photo 6) within the laboratory itself: gas-liquid chromatographs, pH meters, and ion measuring devices. These instruments keep continuous tabs on the health of the drilling operation.

New Safety Margin

But not all data comes from the surface. Geotec has also created a *down-hole* tool. This instrument sits behind the drill bit, thousands of feet under the ocean surface. It monitors conditions at the drill head to detect dangerous pressures as soon as they are encountered.

As I watched, the drill crew hit a gas pocket at about 4300 feet. The computer registered instantly that we hit it and what the pressure was. The information was called down to the drilling floor. The system quickly determined that the extra pressure could be contained, so it was safe to continue. In minutes, the crew was drilling again. Without the down-hole tool they might have missed the initial indications, or have had to do lengthy calculations before they could resume drilling.

Another thing the down-hole

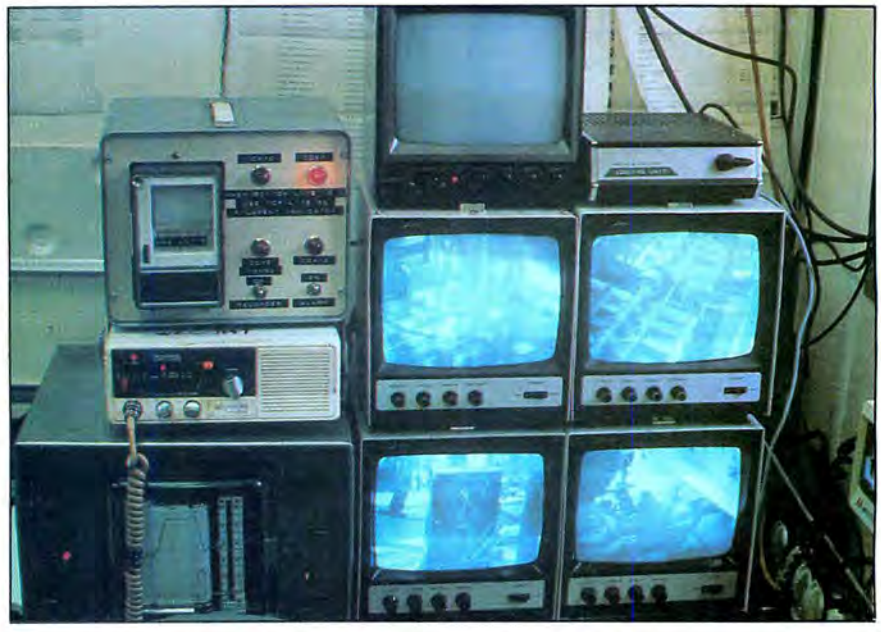


Photo 6: *Inside Geotec's laboratory trailer are the traditional analytical instruments. But this equipment feeds a continuous stream of data to the Apple computer for comparison, formatting, and evaluation.*

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Photo 7: *Geotec's system is an Apple in disguise. Their packaging protects the Apple's electronics and provides a compact mounting for a disk drive and video monitor.*

tool does is keep track of where the drill is. Drill shafts rarely go straight down, so drillers must take care to drill in the right direction. The tool allows the computer to continuously track the drill head in three dimensions.

Disguised Apple Evaluates and Reports

Information from all these devices now flows directly into the Apple II computer for evaluation. The computer digests it to prepare a morning report that the drill foreman sends to Occidental Petroleum in Houston each day. Without that data from Geotec's specialized instruments, wells like the one I saw could not be drilled.

You might not recognize the Apple on this oil rig. Geotec has exchanged its familiar beige case for a rugged metal console (photo 7). But inside, there is an Apple and very little else. Since most measurements are made directly by the computer using its built-in analog inputs, Geotec had only to add an Applesoft language card, a printer controller, a real-time clock, and an interface to some of the specialized lab instruments. Then they were off and running!

Reliability Under Adverse Conditions

Geotec originally chose an Apple II, as opposed to building something from scratch, because it was the quickest way to a complete system. They keep using it because of reliability. Of course, a personal computer is a good, low-cost controller. But on an oil rig, cost is not a problem. Downtime is. The system runs twenty-four hours a day, as does the oil rig. If the hardware fails at 3:00 AM, someone at Geotec can expect a phone call, followed by a helicopter landing on his front lawn. So reliability is a major concern.

But dependable performance can be hard to come by out in the Gulf. The environment equipment must face on an oil rig is quite hostile. Sometimes the power is 60 Hz and sometimes it is not. Line voltage can vary by plus or minus twenty volts. Out there, minicomputers tend to die. Geotec hoped that the Apple II's special switching-type power supply would be more resistant to power problems.

The results have been impressive. So far twenty-one rigs have been equipped with these systems. The systems run twenty-four hours a day, seven days a week. They stop only when rig power is shut down. There has been only one failure in fifteen months of operation.

A week before my visit there was a hurricane in the Gulf. During such heavy weather, drillers shut down the rig, take the people off, go back to Houston, and cross their fingers. Then they wonder what is happening to their rig in the storm. When the weather blows over they go out, hose off the mess, and start things up again. But this time, they left the computer and instruments on, connected to battery power and a telemetry link. While the hurricane raged, engineers in Houston could watch the stresses and strains on the rig. It was a first and it added an important new tool for disaster control to the oil man's arsenal.

New Engineering Potential

Oil-rig monitoring is a personal-computer application that not many would think of, but Geotec did. Its implementation reflects a new engineering approach to microcomputers. These small systems are basic building blocks, just like fractional-horsepower electric motors. You can treat them as black boxes, with a transfer function that you determine by a program. What goes on in the middle really does not matter much as long as you get the function you want, reliably and at the right price.

As we look at these *components*, bear in mind that they now have gained the traditional component advantage of a mass-production economy. Personal-computer vendors are beginning to sell into consumer markets where the volumes are huge. If we look at microcomputers that way, as a component for the toolkit, we may find that speedy development, flexibility, and reliability are the pleasant benefits of having computer power where it is needed.■

About the Author

Phil Roybal is Product Marketing Manager for Apple Computer Inc.

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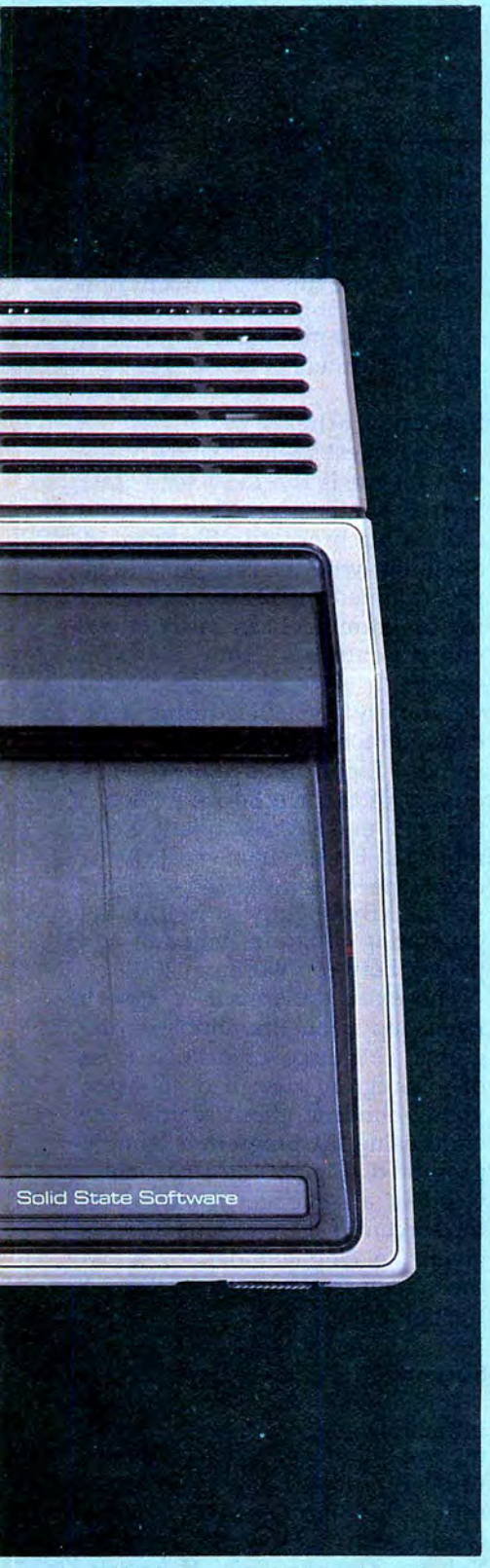
Product Review

Photo by Paul Perry.

Photo 1: *The Texas Instruments 99/4 personal computer.*



The Texas Instruments 99/4 Personal Computer

by Chris Morgan

The TI 99/4, Texas Instruments' first foray into personal computing, was announced in June 1979. It combines some very clever features and some frustrating features in one tantalizing package. The feeling I get from working with this machine is one of great promise—after all, it was designed by the same company that introduced Speak & Spell—an undeniable engineering triumph in anyone's book. That the 99/4 does not always deliver on this promise may or may not be relevant to you. This depends on whether you are an inveterate computer "hacker," or a more casual beginner looking for a personal computer that can double as a sophisticated video game. I'll discuss the pros and cons of the 99/4 later in this review. First, I'll describe the features of the machine and its accessories.

Features of the TI 99/4

The TI 99/4 comes with 16 K bytes of programmable memory, 26 K bytes of read-only memory, a built-in keyboard, and a plug-in slot for Solid State Command Modules (containing programs in up to 30 K bytes of read-only memory per module). The basic 99/4 chassis is shown in photo 1. The Command Module slot is in the upper right-hand corner. The basic unit retails for $950. It connects to a color video monitor (an excellent one with a 13-inch diagonal-measure screen is available from TI for $450—it's made by Zenith). Alternatively, an RF (radio frequency) modulator can be purchased for $75, enabling the 99/4 to be attached to a regular color television. The 99/4 displays text on 24 lines, each of which contains 32 characters. In graphics mode, up to fifteen different colors can be displayed, with a resolution of 192 by 256 points. The 99/4 also features a built-in speaker that can produce three-note chords over a five-octave range. The 99/4 is one of the few personal computers that can produce a decent chord on pitch (at least to these ears!).

As far as built-in software goes, the TI 99/4 offers a floating-point BASIC package (floating-point arithmetic is useful for scientific calculations) called TI BASIC. It is not compatible with most other BASIC packages. Users cannot program the 99/4 in assembly language. (Incidentally, the 99/4 uses a 16-bit microprocessor, the 9900, designed and manufactured by Texas Instruments). The operating system (ie: that part of

the built-in software that controls all the functions of the computer) is not accessible to the user, either.

The 99/4 allows users to plug in their own cassette-tape recorders to enter and record programs. Each unit comes with three explanatory books that cover the workings of the unit in great detail and with an eye to the beginner.

Peripheral Devices

A wide range of optional add-ons is available for the 99/4. A $399 thermal dot-matrix printer prints up to 32 characters per line on 3½-inch-wide thermal paper. The Model PHP1600 modem (modulator/demodulator) is actually a Novation Cat modem that allows you to send and receive data over the telephone. For an additional $44.95, the terminal emulator lets you use remote data services such as The Source or MicroNet to receive wire-service news reports on your video screen, as well as a host of other services. If you want a 5-inch floppy-disk drive, the Disk Memory Drive costs $499.95; the disk controller costs $299.95, and can handle up to three drives. Storage capacity is 90 K bytes per disk.

The 99/4 is one of the few personal computers that can produce a decent chord on pitch.

An RS-232C serial port is available for $224.95, to allow the connection of a printer or other serial devices.

All of the peripherals plug together in a row reminiscent of a freight train going across your desk —a potential problem if your desk space is limited.

Speech Synthesis

The biggest selling feature of the 99/4 for me is the $150 Solid State Speech Synthesizer. This is essentially a big brother to the Speak & Spell, but with the capability to be programmed in BASIC. Enterprising programmers can easily create entire sentences from the synthesizer's several-hundred-word vocabulary, as I did during a recent demonstration at the Consumer Electronics Show. The quality of the synthesized voice is flat and uninflected, but it is far more intelligible than most of the other speech synthesizers on the market. By slightly adjusting the generating program, you can add pauses between words.

The extra dimension of speech livens up even the simplest programs, as I discovered in the case of a program designed to teach young children about words. The child using the program is audibly prompted to pick out a particular word in a sentence displayed on the screen. If the correct answer is given, an elephant dances across the screen to a tune generated by the computer.

Software

I believe that the 99/4 is ultimately going to stand or fall on the quality of its software. Milton Bradley has created for the 99/4 a series of four games called the Gamevision series. It includes Yahtzee, Connect Four, Hangman, and ZeroZap. I have had some limited exposure to the first two

Photo by Paul Perry.

Photo 2: *Joystick for the 99/4, and a sample Solid State Command Module, a plug-in program module that stores a program in a read-only memory.*

mentioned; they seem to be well thought-out, with good color graphics, although they're not quite my cup of tea.

I *was* impressed by the Early Learning Fun program cartridge. I showed it to a specialist in preschool learning, who thought it was excellent. Citing its bright color graphics and positive reinforcement through sound and movement, she said it would easily hold the attention of children in its intended age range of three to six years. The program offers a series of learning activities involving number and letter recognition, counting, sorting, and the alphabet —as well as first computer skills. The program is essentially a cleverly disguised series of multiple-choice questions—not one of my favorite teaching methods. In this case, though, there's enough action on the screen and sound from the speaker to captivate preschoolers. Although the program is specifically designed for three- to six-year-olds, we decided to try it on a couple of eight-year-olds. Sure enough, they lost interest after five minutes. This only points up the fact that any educational material, whether it is presented on a computer or not, must be well suited to its intended audience.

The biggest selling feature for me is the Solid State Speech Synthesizer.

Another novel use of the personal computer is a program called Physical Fitness, which gives a thorough description of a series of exercises. It then acts as your "coach," putting you through a ten-minute routine, involving dozens of exercises such as jumping jacks and knee bends, by flashing instructions and simple diagrams on the screen along with sound effects to help you keep time. It's a clever way to help you do your full allotment of exercises. And since the computer randomly changes the sequence of exercises, you're always on your toes. Very enjoyable.

All told, there were about twenty program modules available for the 99/4 at the time of this writing, only a few of which I was able to audition in detail. In a recent issue of *Boston Computer Update* (an excellent magazine put out by the Boston Computer Society, 17 Chestnut St, Boston MA 02108), Roger Alan Jones pointed out some inconsistencies in some of the educational modules. The Number Magic module, for instance, begins with a simple "flash card" exercise in which the student tries to solve a mathematical problem posed on the screen within a given time limit. The program begins with simple single-digit problems, but then quickly graduates to such tricky problems as dividing 162 by 27 in fifteen seconds. Such problems will surely be ironed out in time. The high quality of many of the programs is evident, even if they fall short in some details.

Photo by Chris Morgan.

Photo 3: *The Texas Instruments store in Dallas, Texas. It is one of a small group of such stores across the country where TI products are sold. More stores are planned. The TI 99/4 is being marketed in large department stores such as Macy's in New York City, and in a wide variety of locations around the country.*

Some Reservations

What *don't* I like about the 99/4? For one thing, the keyboard. As you quickly discover, the 99/4's keyboard is sufficiently different from a standard typewriter keyboard that you will probably be frustrated in your attempts to touch-type. The lower right-hand key, normally a shift key on the typewriter, is the ENTER key on the 99/4. The spacing on the keyboard is awkward and can lead to errors. The 99/4 is also an upper-

case only machine, a limitation for any kind of word processing.

TI BASIC has some limitations, too. What the 99/4 really needs is an Extended BASIC package along the lines of Microsoft BASIC. So many programs are written in some form of Microsoft Extended BASIC these days that it is frustrating to be without it. Also, the inability to program in assembly language on the 99/4 will make many dyed-in-the-wool computer fans think twice before buying a machine without this capability. TI is expected to release an Extended BASIC package sometime this fall, and I've heard talk that there might be at least some limited access to the assembly-language level in the future.

The 99/4 was intended to fit the needs of the newcomer who is more involved with interesting applications than with serious programming. At this level, it works.

To be fair to Texas Instruments, the 99/4 was never really intended to be a "hacker's dream," but rather to fit the needs of the newcomer to personal computing who is more involved with interesting applications than with serious programming. At this level, it works. But in order to be a real tool for teaching the creative art of programming, the 99/4 needs some ergonomic rethinking. Rumor has it that Texas Instruments is redesigning the 99/4 keyboard, but don't expect this update for some time yet.

The 99/4 does many things well. Whether or not it can compete with the Apple II and Atari 800 (which are in the same price range) is the crucial question. The sheer amount of good software presently available for the latter two machines is a tough act to follow. It will be interesting to watch the three machines battle it out over the coming year. But in the meantime, don't underestimate TI's staying power.■

Book Review

Introduction to Pascal *by Jim Welsh and John Elder, Prentice-Hall International, 1979, 282 pages, softcover, $14.95*

Review by: Paul L Rogers

Mr Welsh and Mr Elder have produced an introductory book on Pascal that is easy to read and understand. Throughout the book, many examples are used to illustrate each point. Also included are seventeen example programs, each illustrating an important feature of the language. Each major topic is described in its own chapter, which leads to a book that is superior in organization.

In the first chapter, the authors introduce several basic concepts. The first section describes a typical computer and its major components. Following this brief discussion of hardware, the process of writing and execution of programs is examined. Finally, three important programming objectives—correctness, clarity, and efficiency—are presented.

The second chapter deals with the basic syntax of Pascal. An extended BNF (Backus-Naur form) nomenclature is introduced which is used to describe Pascal throughout the remainder of the book. Also introduced are special symbols, numbers, identifiers, strings, and comments. At this point, the basic structure of a Pascal program is described.

Data types are the subject of the third chapter. The four basic data types: integer, real, character, and boolean are introduced. The authors also present the enumeration and subrange types. The last portion of the chapter gives the syntax for constant and type definitions and variable declarations.

The fourth chapter is devoted to introducing the syntax for expressions and the assignment statement. Many examples are employed to clarify the material.

The topic of input and output is treated in the next chapter. The predefined procedures read, readln, write, writeln, and page are presented. Additionally, the predefined functions eof and eoln are described. The formatting features of the write and writeln procedures are also demonstrated in this chapter.

Chapter six deals with the basic control structures available in Pascal. The authors first introduce the compound statement. The next topic is the repetitive statements, which includes the **repeat** statement, the **while** statement, and the **for** statement. Finally, the **if** and **case** statements are presented.

In chapter seven, the authors present the important concept of procedures and functions. They explain why a programmer would want to use procedures and functions. They then discuss issues such as block structure and scope, value and variable parameters, procedures and functions as parameters, and recursion.

A brief chapter is devoted to the **goto** statement. The authors suggest that the **goto** statement should be reserved for use in handling exceptional conditions.

Chapter nine introduces a structured data type, the array. After an introduction to one-dimensional arrays, the authors describe multidimensional arrays, packed arrays, and strings.

The record, another structured type, is presented in chapter ten. A record allows the programmer to group different data types in the same data structure. The authors give quite a few examples of how this facility of Pascal can be used to the programmer's advantage. Also described are the **with** statement and variant records.

The next chapter is devoted to sets. The definition of sets is discussed, as well as the operations performed on them.

Files are the subject of chapter twelve. The predefined procedures reset, rewrite, get, and put are described. Also, more information is given on the procedures and functions presented in chapter five.

The last chapter is devoted to pointers. The predefined procedures new and dispose are introduced. The authors also show how complex data structures such as lists, stacks, and trees can be built by using pointers.

One very helpful appendix giving syntax diagrams is included. It will be an invaluable aid to a person learning Pascal.

Although this is an excellent book, it does have one major flaw. In my opinion, the programs lack good indentation and have few comments. To offset this flaw, I strongly recommend that the reader obtain a copy of *Pascal With Style: Programming Proverbs* by Ledgard, Hueras, and Nagin (Hayden Book Company), a book which should be read and reread by all Pascal programmers.

Overall, *Introduction to Pascal* is an excellent book and Mr Welsh and Mr Elder should be congratulated for producing it .■

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SOFTWARE

We recently took some time to look into a crystal ball with two of the leading experts in personal-computing software, Bill Gates and Dan Fylstra.

Bill Gates is the young president of Microsoft Inc, a company well known in the industry as the developers of Microsoft BASIC, now used in many personal computers. They recently introduced the Z80 SoftCard, an accessory for the Apple II computer that allows CP/M programs to be run on the Apple. (CP/M is a popular operating system used in a variety of personal computers.)

Dan Fylstra is president of Personal Software, a young, dynamic company in the software market. Personal Software's VisiCalc program (sales of which have topped the $1 million mark) is an excellent example of the new breed of sophisticated personal-computer software.

We asked Bill and Dan to give us their thoughts on the direction of the software market during the next decade. Their answers follow:

OC: *Do you have a general feel for where the market is heading in the 1980s?*

Bill Gates: That's a long answer. The key trend as far as software goes in the 80s is that it becomes more important. In fact, it will actually define the personal computer. The cost of the hardware goes way down. If you're talking about the 80s, or even the next three years, the hardware components become much less important. As standard features, the personal computer of the future will have high-resolution graphics, sound response, music response, a light pen, special function keys, and so on. In a few years, you could make a machine for $600 that has all those things. The key thing to make that highly sophisticated machine useful is software. There are really three different areas that software is used in. The first is today's concept of software: you turn on the machine with a BASIC interpreter built in. In order to interact with the machine, you're asked to have some knowledge about programming. That idea is changing fairly dramatically, in terms of how to present information to the user. There are high-level graphics languages and high-level sound languages. Such approaches let you better take advantage of the hardware capability.

"The key trend as far as software goes in the 1980s . . . is that it will actually define the personal computer."

The second software area is the home data base in which you have a query language to work with the local data system. Examples of this would be VisiCalc or a word processor. You immediately exchange information with the computer, without having a lot of specific knowledge about defining the complete application.

The third area is the remote data base, in which you have a query language in English to send information to you over phone lines, cable, or video data base. It's a fairly dramatic change from what we see today.

OC: *Do you think that the English-language approach to software is going to become popular in the next few years?*

BG: Oh, absolutely. If you want to get computers into the mass market, you can't teach everybody how to program. If you *do* want to teach people how to program, the newer, more extended versions of BASIC with really good graphics and sound, and good screen editors, are very good for somebody who's willing to read a hundred-page manual before they sit down and take advantage of the machine. But in a high percentage of the cases, people will simply plug in packaged programs that are already written for the machine. There are some high-capacity ROM (read-only memory) modules that manufacturers will use for storing programs in the computer itself. One problem with ROMs for disseminating software is that they're super

IN THE 80'S

inflexible. Very few people can afford to put software into ROMs. Companies like Personal Software or Microsoft can distribute them. But someone at home doing a bowling-league program or some specific application isn't going to go through all that effort. You've got to give them some other way of creating a software package for redistribution.

OC: *What about the problem of software piracy—how do you feel about letting the owner duplicate a disk for backup?*

BG: We have a program called Adventure, and we recently did a release in the TRS-80 version that allows the owner to make one copy for backup. People demand that for convenience.

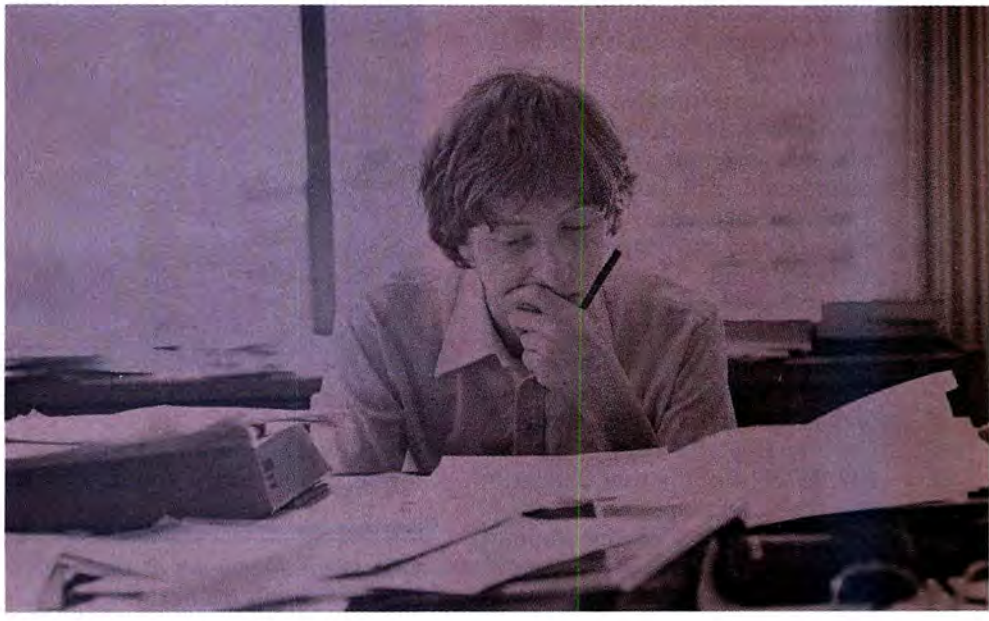
OC: *Have you found that there is much pirating of the software in a case like that, where you haven't write-protected the disk?*

BG: Oh, we still write-protect the disk. We only let you make one copy. Then you can use that one copy. If your primary copy is destroyed, you can use the backup while you send away for a replacement.

OC: *But what if some enterprising programmer can get around that?*

BG: Certainly it's a detriment. Only the companies that can really sell high volume can afford to price software in such a way that it won't be pirated, and they can afford to put a lot of effort into the documentation and the other parts of the package.

OC: *Microsoft's new Z80 SoftCard lets people run CP/M programs on the Apple II computer. Tell us about that.*



Microsoft's president, Bill Gates.

BG: The beauty of the SoftCard is that it expands the number of software packages you can run. In fact, it brings the whole set of CP/M software onto a system that has high-resolution graphics and a lot of other good software; so you pick up all of that software and expand the applications the machine can be used in. This type of thing is what is going to be so important in the future—to build on the existing applications. If somebody comes out with a new machine, it will be important to have a BASIC that's compatible with what's been done in the past so you don't have to start from scratch.

OC: *Microsoft BASIC has become the standard in the industry. Do you see its position continuing to get even stronger?*

BG: Absolutely. We just did the Mattel BASIC and we're doing the Atari BASIC, and every Japanese computer that's coming over uses exactly that BASIC.

OC: *What about Texas Instruments?*

BG: We did the BASIC for TI, but we did it to their specs.

OC: *Do you see the emergence of a single software standard as being a necessity in order to reach the mass market?*

BG: Yes, everything we do is becoming a standard on a lot of machines.

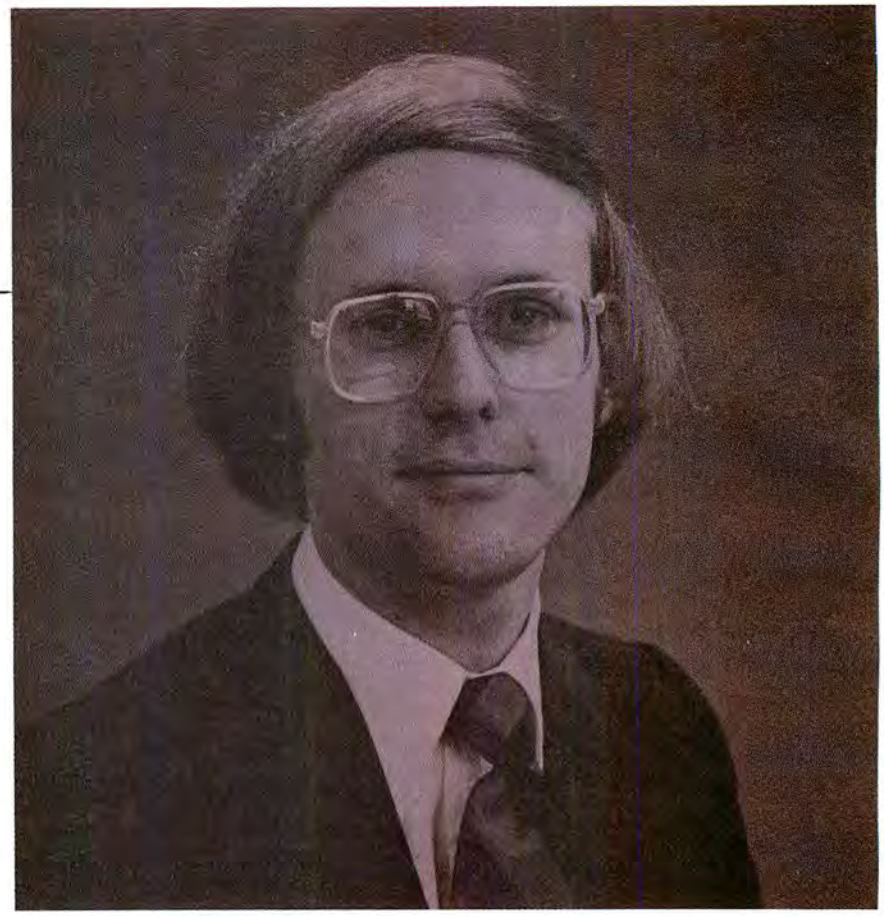
OC: *Do you think there is going to*

be one particular machine that will dominate the market in the next few years?

BG: No. The technology is moving too fast. There are too many channels of distribution. People get lucky, and somebody writes really good software programs for their machine, so their machine sells well in an unusual market segment. The thing will continue to be very widespread for the next three or four years; very fragmented. Although I certainly think that because of software, Radio Shack and Apple have a lot of momentum.

OC: *I hope the same thing doesn't happen to software that happened to four-channel stereo. There were several noncompatible formats, and because of that the whole thing failed to take off.*

BG: Well, there is that danger, and that's why we encourage people to work with the standard. We send a lot of people to use CP/M (even though CP/M has limitations) because of the incredible savings in the software area from having that standard. That's what we're doing with the extensions to BASIC. There are also high-level protocols used to communicate with data-base computers. We have a proposal for what those protocols should look like, so we're now building that control software into the ROMs of personal computers. Instead of interacting with the whole computer on an essentially "dumb" terminal basis, the remote computer can send a command to take advantage of the graphics or the sound. A single command can, say, draw lines on the video screen, play a tune, or redefine a character. Because the hardware is a lot different, coming up with the correct protocol is difficult. We're working with a lot of different people to try and do that.■



Personal Software's president, Dan Fylstra.

OC: *What do you see as the single biggest trend in the next few years in personal computers?*

Dan Fylstra: There will be two very important basic trends that I see. One is the availability of really large, low-cost mass storage, which is going to give rise to the extensive use of personal data bases. The other is the integration of communications and personal computers. That will probably give rise to distributed data bases like the *New York Times* system, UPI, AP, Dunn & Bradstreet, and so on, being used in conjunction with little ones—everybody's own system. There are some kinds of data not being collected yet that should be, such as grocery prices, and so on. I have always wanted to have a system in which you could say, "I want a piano, I'm willing to pay so much, and I prefer the Chickering brand"—all the parameters you can think of—and the system will do the searching for you. If there's nothing available, it would begin to advertise. So you get a marketplace that could be a lot more efficient than the current marketplace.

OC: *What about video disks?*

DF: That's certainly one form of really massive storage. Sooner or later the current problems with video disks will be ironed out, leaving a reasonably low-cost way to write your own disks. And massive amounts of information could be made available at low cost to all kinds of people. You would also expect some integration of computer digital data storage and video data storage. Even though you could keep all the books in the world, you couldn't photograph them. The computer systems of the future will have the ability to search for data in fairly sophisticated ways, rather than flipping page-by-page

"There will be two very important trends in the 1980s: the availability of really low-cost mass storage, and the integration of communications and personal computers."

or frame-by-frame like you do now, but rather following links around and searching for information clues. Those are the things that have the biggest impact, that can provide the power to make the personal computer useful for nonbusiness, nonprofessional, nonentertainment uses (ie: home uses).

There's another important problem that must be solved, and I think will be solved. In order to make computers useful and to make it possible for the greatest number of people to use them, we have to create software systems that strike a balance between rigidity and flexibility. Today's systems are usually either too rigid—meaning that they solve a very particular application, but they don't give you much flexibility to tailor that application to your own needs—or else they're flexible but the user has to learn a lot, know a lot, and do a lot to make use of that flexibility.

That's a problem for software producers like us because of the economic considerations. When an application is specialized and the market for that application isn't very large, it's costly to develop the software, and the user price has to be high. On the other hand, if a program is too complex or too confusing, it is just not going to find a mass market.

OC: *It's an automatic limitation.*

DF: Yes. One step we've taken is to introduce VisiCalc. (VisiCalc is a general problem-solving program that allows the user to enter data on a large "blackboard"—actually the video screen—and manipulate it. It has applications in accounting, mathematics, and business.) VisiCalc requires less knowledge, and it's closer to the real application than BASIC, but it will provide you some kind of flexibility. But that's just one step, and there should be all kinds of specialized languages or notations in effect that people can learn very quickly.

One of my favorite analogies comes from Bob Frankston of Software Arts. When the telephone system was just beginning to expand rapidly and a lot of people were getting telephones, there were individual operators who would connect your calls. It became clear that we needed more and more operators as time went on, that more and more people would be using the telephone a lot, and that we would need as many telephone operators as there were people in the entire population—there was a growing need for telephone operators that could not possibly be filled. Today everyone has a telephone, everybody uses it a lot, but we didn't have to make everybody into a telephone operator. But on closer examination, we really *did* make everybody a telephone operator—it's just that the telephone company, with the aid of switching circuits and good design, made it so simple to be a telephone operator that we all do it every day without thinking about it. It would be desirable to make a computer so simple to use, or a computer language so straightforward, that it would become second nature, like the telephone. You wouldn't even be aware that you're giving commands.

OC: *What about software standards?*

DF: The other problem we face is there are so many software packages coming from all over; and they're generally not designed to work together. For instance, within our own organization we get software from many different sources, and things would be a lot more useful if you could save data from one program and load it into another program. Or you might want to be in a calculation mode while working with a word-processing program, but because the software comes from different sources, there is no convenient way to do it. The market is not producing integrated systems, so a big goal is to achieve some integration of the different application systems. We're trying to make a move that way with an updating interchange format for VisiCalc and VisiPlot. In the new version of VisiCalc, there's a new command with a specific purpose of saving modelling data so you can pass data between VisiCalc and any other program in a very easy way. As a standard, we have a document called the "data interchange format standard" that will be included with every VisiCalc program on all the different machines. I want to encourage people to use it. You'll be able to do a projection of VisiCalc, and present it as profit-and-loss figures, for instance, then immediately call up VisiPlot with just a couple of keystrokes—no special effort. Again, that's only one step. We'd like to do more ambitious things in the future.■

The Perils of Pioneering in the Software Industry

by Alan M Meyers

The microcomputer software industry is the most exciting new industry to appear in a long time. But anyone who thinks that it's all glory and gold is mistaken. This seems to be the view held by most software consumers. It couldn't be further from the truth. In this nonstandardized industry, the choices are many, the problems are endless, the headaches never stop, and only the strong survive.

For those software companies who have chosen to support the personal computer (the Tandy/Radio Shack TRS-80, the Apple II, the Commodore PET, etc), it's like playing an Adventure game, except that the perils are real and never ending. Imagine shopping for a stereo system where every brand required a different type of phonograph record. Imagine being the record producer. Which system do you support? One of them? All of them? The best or the biggest?

The microcomputer industry has this problem, with different microprocessors, different languages, different disk operating systems, and a plethora of peripheral devices. Even if every system used the same microprocessor, there are a dozen or so printers, communicating in either parallel or serial mode at different data rates. There are two sizes of floppy-disk drives with different numbers of tracks, some with double density, and some with double-sided double density. Then there are tape drives, hard-disk storage, and soon there will be video disks. If the consumer is confused by all this, pity the poor software producer; he takes enormous risks no matter which system or con-

About the Author

Alan Meyers is the former Advertising and Public Relations Manager for The Bottom Shelf Inc. He is also the author of the CHECKBOOK II program for the TRS-80.

figuration is chosen. But, alas, a choice must be made. Some have chosen to support one system and some have chosen to support several. But once the systems are chosen, the Adventure begins, and it's a long way home.

Users Need Quality Software

Everyone claims to write quality software. There seem to be as many definitions of "quality" as there are software companies. Quality software, to this writer, is a program that is logically structured, simple to use and understand, foolproof, and functional. It should have well-thought-out video displays and printouts. The program should be able to handle user errors and respond to the user in an understandable way. The program should be flexible, giving the user as much freedom as possible. Finally, the program must be predictable. It should literally dominate the computer, to become, as far as the user is concerned, the system itself.

Finding a prepackaged program to fit your needs is no easy task. If you sit down before you buy a program and list the things you want to accomplish for a particular application, the chances are you'll discover that there is no one program that fits your needs exactly. This is because the software companies cannot cover all the possibilities and are forced to compromise.

Software companies have to make money. To do this, their software has to be general enough to meet most of the needs of most of the people. The volume of sales is the key to success. One does not make money by selling ten copies of 100 different programs, but rather by selling 500 copies of two programs. If the software companies were to write programs to cover all the possible system configurations and user needs, the companies would have to produce dozens of versions of each program. As anyone in business knows, this is not cost-effective.

Producing quality software is not easy. The software producer usually does not personally write the program; instead, strong suggestions are given to the programmer. Sometimes the program a company wants to produce is already written. In this case, the producer reviews it and makes suggestions about improving it to meet company standards. Usually the program is embellished with utility routines the software company has already produced.

It's like playing Adventure, except the perils are real and never ending.

Many times, the desired program does not exist. In this case, it is contracted out to a programmer. From the initial concept to the finished product, the road is long. The company's system designer must maintain an ongoing dialog with the programmer. After the program has been designed and written, the real work begins. A program is never finished; it only gets more refined. Without fail, or so it seems at times, the system designer will come forth with the immortal words, "Just add this one little feature." For the programmer not used to writing for the public, this can be quite frustrating. But, prepackaged software must do more than merely work. It must also look good. Input and output are all the user sees, so more than sixty percent of the program can be screen and printer formatting. In the software market, it's not only performance that counts—the program must have class.

Problems, Problems, Problems

Sophisticated software is made of program modules which, in turn, are made of smaller modules, and they all interact by passing variables, receiving input, and giving output. For instance, a random-access data-management system has so much interplay between modules that the chances of producing a perfect bug-free program are almost nil. The software producer can only test and retest, and finally believe that the product is ready for production. Still it seems that someone, somewhere, always uncovers an error that no one else has encountered.

Software is developed through dynamic evolution, and at this point in the development, we are all involved in experimentation, producers and users alike. This is not an excuse; it is reality. Pioneers get arrows.

Anyone who has bought mass-produced software has had the problem of not being able to load it. Whether it is bought on tape or disk, this happens. In the production of mass quantities of computer software, it's not unusual for a bad tape or disk to slip out unnoticed. Most problems can be traced to the medium itself.

The problems are twofold. First, unlike normal audio tapes, computer-readable tapes cannot have any bad spots or glitches on them. If you have a stereo cassette system, chances are most of your tapes have flaws in them. But these glitches last only a fraction of a second and are normally never noticed. However, your computer hears everything. One glitch, one lost byte, and the package is useless. It is no easy job producing 1000 perfect tapes.

The second problem is that the medium is magnetic and unstable. Tapes and disks don't like extreme temperatures, static electricity, and especially magnets (which are everywhere). I personally tested a program, packaged it, and sent it across the country by United Parcel Service.

It didn't work when it got there. I tested another copy and sent it by US Postal Service. This time it worked. Problems like this can drive the software producer crazy, not to mention the customer.

Many times the problem is not in the software at all, but in the customer's hardware. It is not uncommon to have a program returned to us because it wouldn't load, only to have it load perfectly in our machines. This is particularly true of disks. The cause can be anything from a different alignment of the disk-drive heads to bad memory. For example, with the TRS-80, many of the problems lie in data separation. If you've ever listened to your disk-drive head go back and forth trying to read something, then you probably have data-separation problems. This is so because Radio Shack did not use sufficiently sophisticated circuitry in their expansion interface to guarantee disk input/output (I/O) reliability. Percom Data Company manufactures a plug-in board that seems to solve this problem.

The industry *has* come a long way in the state of the art of software production. It *still* has a long way to go.

Will Someone Explain These Instructions

Have you ever read the instructions to the program you've so anxiously awaited and discovered that you still didn't know how to run the program when you were finished? Computer users can be divided into two basic categories; those who know their machines and those who don't. Those in the first group will get the program running no matter how oblique or obscure the documentation. Then there is the total novice, truly the pioneer of pioneers in the industry. This person has bought a machine and doesn't have the slightest idea of how it runs; nor does he care. He just wants it to work. He may not know a blank disk from a formatted disk, or DOS from BASIC. This is the person the software industry must now face squarely, for there are many of them. Most documentation of sophisticated software mistakenly assumes previous knowledge. Documentation in the future is going to have to read like an elementary textbook, leading the novice step by step through every phase of the program. This implies hiring skilled technical writers who can communicate on the level of the novice without insulting his intelligence. Good documentation is as important as the program itself. No matter how well a program is written, it's not worth much if the customer can't understand how to run it. Good documentation costs money. The company that dedicates this money to educate its customer may end up the leader in the industry.

The biggest problem facing the software industry is unauthorized reproduction.

Nobody Loves a Pirate

Of all the problems, the biggest one facing the software industry is unauthorized reproduction. The initial software market consisted of hobbyists, many of whom felt there was nothing wrong with copying a program and giving it to a friend. What these people do not understand is that, first, it is against the law, and second, it takes badly needed money away from the producer. This, in turn, takes money away from the programmer, who may finally decide it's not worth the effort to write programs for the mass market. I would not be surprised to learn that, for every copy of the Electric Pencil word processor sold, there are three unauthorized copies given away. The short-term loser is the software producer; the long-term loser is the consumer. Companies are not going to produce sophisticated software if they can't make a profit.

Some companies have gone to elaborate means to secure their software, making it nearly impossible for the average user to see or change the program. Programmers love this; users hate it. With unsecured software, the producer can tell the user how to fix a bug. The major problem with secured systems is that if a bug is found, the entire package must be exchanged. More and more companies are going to start securing software if the market does not mature. One hopeful sign is that we are seeing a large increase in small-business users. Business software is much more expensive than hobbyist software, and the users are less apt to give copies away. From this perspective, not surprisingly, the future of the software industry is in the hands of the consumer. It must be understood that when people give away (or worse, sell) copies of programs, they are, in the long run, robbing themselves.

Sell, Sell, Sell

Here we get to the heart of the matter. A software producer may have top-notch software and documentation, but it still must be sold. Depending on the computer being supported, the prob-

lems of marketing range from difficult to nearly insurmountable. Everything centers around the quantity of dealers and the quantity of computers sold. Most people will agree that mail order is not the best way to buy software.

It would be much easier if you could walk into a store and buy the desired program off the shelf. For those companies supporting Apple, PET, Exidy Sorcerer, and similar computers, it's a question of volume. There are about 3000 computer stores around the country, and most sell these computers. The dealers are more than happy to sell software that supports their hardware sales. So if a software package is a good one, chances are the dealers will sell it. The problem here is the number of machines. Most have not reached the 100,000 mark. They are usually well below that. For a company to turn a profit here, it must have a very popular program or charge a higher price.

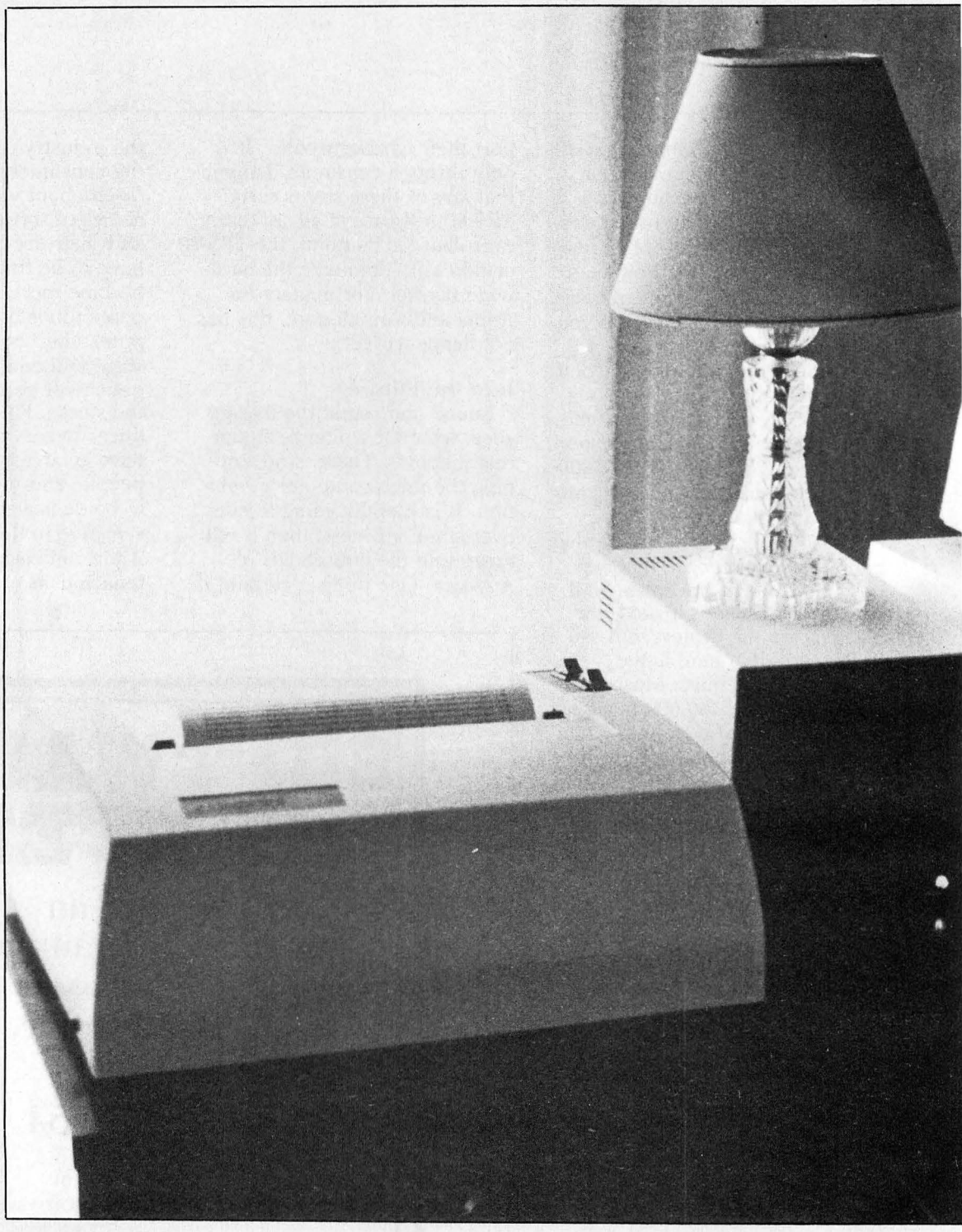
For companies supporting the TRS-80, the problem is reversed. There are more than 250,000 units out there, and some reports put it way above that. With over 6000 Radio Shack stores, you would think that marketing TRS-80 software would be a snap. Unfortunately, Tandy seems disinclined to support its computer by selling quality outside software. Nor does Tandy supply software producers with operating-system details. With a few isolated exceptions, Radio Shack offers nothing but their own small selection of software. The TRS-80 owner is forced to order through the mail or buy from those computer dealers who will carry TRS-80 software. Most computer dealers would rather not deal in it as it does not support their hardware sales. It is only through consumer demand that any of these stores carry TRS-80 software at all. If Tandy ever changes its mind, the TRS-80 could easily dominate the hardware market. Fortunately for Apple and Commodore, this has not happened yet.

Into the Future

Round and round the market goes, where it will end, no one really knows. There is no stopping the microcomputer revolution. It is literally going to take over small business, then it will creep into the households of America. One thing is certain; if the industry does not standardize, the consumer will remain confused about what to buy. When it comes to software, the programs and their documentation will have to be first class. As people become more educated to the possibilities of the microcomputer, the "cottage industry" stage will end. The personal computer will become as common as the stereo. For a software producer to survive, he will have to have good organization, top-flight people, and money. He will have to be dedicated to computing and sensitive to the needs of the user. Above all else, he must be tenacious.■

Product Review

A User Review:



THE COMPRINT 912-P

by Bonnie Best

At the 1980 West Coast Computer Faire in San Francisco, I was searching for a printer to interface with my Commodore PET. For over a year I had used the PET in many ways—in my seventh- and eighth-grade mathematics classes, during my evening college class on data processing, at home to improve my programming skills, and to just have fun playing games and entertaining friends. I bought a modem at the previous year's Faire and used it to communicate with other computers, both as a "dumb" terminal and with other PETs in an electronic-mail system. I decided that I wanted hard-copy listings of my programs to make debugging easier and to allow me to edit text.

The printer which most impressed me at the Faire was the Comprint 912-P. It is very fast (225 characters per second, 170 lines per minute) and quiet, with well-formed characters [96 ASCII (American Standard Code for Information Interchange) upper and lowercase characters]. It weighs only 15 pounds and is small enough to fit on top of my file cabinet. It is designed to interface directly to the PET's IEEE (Institute of Electrical and Electronics Engineers) I/O (input/output) port. It appears very durable, with no ribbons, inks, or print wheels to replace. Perhaps most important is the price. My original cost was $560. This year the price has been raised to $660 (plus $39 for an optional RS-232C serial interface). A 300-foot roll of special 8½-inch-wide aluminum-coated paper which lasts quite well and makes excellent copies costs $7.95. Remember that there are no ribbons to buy and only minimum maintenance. A 6-month warranty is included. These were my reasons for buying the Comprint 912-P, and I have not been disappointed.

The unit came neatly packaged in double boxes to prevent damage. It came with an instruction sheet on how to unpack and set it up for a test print. Also included were a warranty card, a 64-page instruction manual, and three application notes on specific interface techniques for the PET, Apple, and TRS-80 computers.

The instructions were clear and easily followed. In less than an hour I had the printer plugged in and ready to test. I consulted the instruction manual on how to load the supplied roll of paper and use the switches to test print. The manual is well written and easy to follow, with good diagrams and photos. My first test print was successful.

I had no difficulty hooking the 912-P to the PET because a friend had wired a connector for me. Most computer stores will help wire the correct connector, although the directions supplied with the Comprint explain the procedure.

The application note supplied with the Comprint provides the necessary program coding for getting PET to control the printer. (See listing 1 for my application.) The greatest difficulty I had was getting it to print lowercase letters. By comparing the ASCII code shown in the Comprint manual with the character codes used by the PET's ASC function, I discovered that the basic difference is the code for lowercase letters. ASCII code for letters "a" thru "z" ranges from 97 thru 122, while the PET code ranges from 193 thru 218. I handled this by subtracting 96 from the PET ASC code. (See listing 2 for my coding.)

Unfortunately, the Comprint does not underline because there is no overstrike on characters. It cannot move backwards or do a carriage return without a line feed. It also cannot print the PET graphics, but few printers have that capability, and those that do are either very expensive or of inferior quality.

Listing 1: *This is all the coding required to give the PET control of the Comprint 912-P.*

```
63200  REM THIS CODE ADDED TO PROGRAM WILL PRINT THE
         PGM ON COMPRINT 912P
63210  OPEN1,28:CMD1:LIST
63220  REM "LIST" ENDS BASIC PGM BUT KEEPS PRINTER OPEN
63230  REM TO REGAIN SCREEN OUTPUT, TYPE
         'PRINT#1," ":CLOSE1' ON SCREEN AND RETURN

READY.
```

Listing 2: *The author overcame a difficulty in getting the Comprint to print lowercase letters by modifying her Word Processor Program in this way.*

```
8914  REM IF REQUEST TO PRINT ON COMPRINT THEN D=28
8915  IFD=28THENGOSUB9800

READY.


9800  REM THIS ROUTINE CONVERTS PET ASC FOR LOWER CASE
        TO ASCII LOWER CASE
9801  D$="":FORPC=1TOLEN(C$):B$=MID$(C$,PC,1):CT=
        ASC(B$)
9810  IFCT>192THENB$=CHR$(CT-96)
9820  D$=D$+B$:NEXT:C$=D$:RETURN

READY.
```

The Comprint 912-P is a microprocessor-controlled printer. It has an automatic-paging feature which can be turned on and off through software control. The 912-P has a 256-byte buffer, and an optional 2040-byte buffer is available. Printing can be stopped by using a no-print-mode control character and resumed by sending the on-line-mode control character. Control characters also provide the functions form feed, to get to the top of a new page; line feed, to skip to the next line at the current character position; and bell, to sound an electronic beep. These control characters can be sent using the appropriate ASCII code with the CHR$ function. All of these features make text editing quite flexible. I am using the Connecticut microComputer Word Processor Program for text editing. I have modified the program to work with my particular disk drive. It took a few evenings for necessary changes and debugging. The complete system is now working very well.

The Comprint 912-P has fulfilled the claims made by its manufacturer, Computer Printers International Inc in Mountain View, California. I recommend this printer to any personal computer owner requiring hard copy, whether program listings, general text, or form letters are required.

Comprint has greatly enhanced my personal computer's potential. ■

About the Author

Bonnie Best is currently a programmer for the Pacific Telephone Company. She has taught a community college data-processing course and sixth-, seventh-, and eighth-grade mathematics in the San Francisco area.

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Selecting A Small Computer for Business, David Benevy, Computer Mart of NJ, 1 pm, Oct. 30 & 31.
Evaluating and Improving Your Computer's Performance, Philip Grossman, Raytheon Co., 1 pm, Oct. 30.
Law Office Systems Aspects of Word Processing, Bernard Sternin, 2 pm, Oct. 30.
Future Smart Machines: 2000 A.D. and Beyond, Dr. Earl Joseph, Sperry Univac, 2pm, Oct. 30.
Computer Contracts - Facing the Issues, Alan C. Verbit, Verbit & Co., 3 pm, Oct. 30.
Acc'ts Receivable/Acc'ts Payable/Gen'l Ledger, 3pm, Oct. 30.
Advantages of Distributed Processing & Multi-Processing, John Steefel, QI Corp., 4 pm, Oct. 31.
Investment Analysis of Stocks & Commodities on a Microcomputer, Fred Cohen, Shearson Loeb Rhodes, Inc., 4 pm, Oct. 30, 3 pm, Oct. 31.
BASIC Programming, Michael Mulcahey, Worcester State College, noon, Oct.31.
Videoprints: Full-Color, Low-Cost, Hard-Copy Computer Graphics, Warren Sullivan, Image Resource Corp.,1pm, Oct. 31.
Business Applications Software Development Via Data Base Management, Dr. Andrew Whinston, Micro Data Base Systems, 2 pm, Oct. 31.
Application of PASCAL to Small Systems for Business, Panel, Stan Veit, Associated Computer Ind., Moderator, 3 pm, Oct. 31.
Educational Software: the Good, the Bad, the Ugly, Jo Ann Comito, S.U.N.Y. at Stony Brook, noon, Nov. 1.
Introduction to Personal Computing, noon, Nov. 1.
Computer-Assisted Mathematics Courses, Dr. Frank Scalzo, Queensborough Community College, 1 pm, Nov. 1.
Artificial Intelligence Update, Prof. Peter Kugel, Boston College, 1 pm, Nov. 1.
Compiling and Retrieving Personal Medical Data with a Microcomputer, Derek Enlander, MD, St. Luke's Hospital, 2 pm, Nov. 1.
The Present State of CP/M Compatible Software, Tony Gold, Lifeboat Associates, 2 pm, Nov. 1.
High Volume Data Handling: Intro. to File Processing, Prof. Peter Kugel, Boston College, 3 pm, Nov. 1.
Connecting the Computer to the Outside World, Prof. James Gips, Boston College, 3 pm, Nov. 1.
Educational Applications in the Home, David Ahl, Creative Computing Magazine, 4 pm, Nov. 1.
Household Applications - Some of Them New, Dr. Dennis J. McGuire, 4 pm, Nov. 1.

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A Review of Four Text-Formatting Programs

by Larry Press

In a recent article, I compared four word-processing systems. Each of those systems provides a screen editor, for creating and modifying text files, and a formatter for printing them. If you already have a screen editor or are content to use the line editor which comes with the CP/M™ operating system, you can save money by purchasing a stand-alone print-formatting program. (See "Word Processors: A Look at Four Popular Programs," Summer 1980 onComputing, page 38. For an introduction to word-processing hardware and software concepts, you might check that article and others in the same issue.)

I will compare four formatting programs which run under CP/M: Script-80, TEX, Text Processing System (TPS), and Textwriter III. (See text box.) I obtained copies of the four programs, used them for a time in correspondence and writing, and prepared a detailed report on 154 program characteristics. This is a summary of that report and my experience.

Text-Formatting Programs Reviewed

Formatter	Producer	Cost
Script-80	J Vilkaitis POB 26 High Street Extension Thomaston CT 06787	$120
TEX	Digital Research POB 579 Pacific Grove CA 93950	$75
Textwriter III	Organic Software 1492 Windsor Way Livermore CA 94550	$125
TPS	Technical Systems Consultants POB 2574 West Lafayette IN 47906	$60

Documentation

Any encounter with a program begins with its documentation. Documentation must teach the new user, serve as a reference for the experienced user, and, if appropriate, help programmers modify the package. Table 1 summarizes the characteristics of the manuals for these programs.

The Script-80 manual is the least useful as a tutorial or reference document. It is short, poorly printed, and coverless. It makes a poor impression and one is tempted to assume that the program is as

	S-80	TEX	TPS	TXTW
Table of contents	x	x	x	x
Index				x
Reference command summary	x	x	x	x
Machine-readable manual	x			
Line drawings		x		
Pages for:				
Introduction to CP/M		25		
Tutorial on the formatter	4	6	12	7
Reference and examples	20	36	18	29
Application examples	2		8	10
Appendices	6	6		8
Source listing			99	

Table 1: *Summary of manual contents. S-80 stands for Script-80; TXTW stands for Textwriter.*

carelessly done, which is *not* the case. There is no index, and the tutorial overview and reference sections are brief and short on examples.

The TEX manual is the best aesthetically and tutorially. It is "perfect-bound" (the type of binding used by this magazine), printed on heavy paper, and features real line drawings rather than computer printouts which try to simulate drawings. It is the only one which is not printed on a dot-matrix printer. The manual begins with a good tutorial on CP/M and the programs which come with it. This material is well written and should be included in the documentation of CP/M itself (TEX is from Digital Research, the same company that wrote CP/M). The reference section is clearly organized. Commands are described in the same format throughout, and clear examples are given for each. There is no index, but the reference section is alphabetized and each command begins on a new page, so the manual is easy to use as a reference.

The TPS manual is well written, but not as well organized as that of TEX. The formatter tutorial is too much like the reference manual which follows, and there are not enough examples. The author of this manual had the toughest job because the system is more complex and general than the others (more on this difference later). This is the only manual which documents the program itself; the others are user manuals only. There is a well-annotated source listing of the program, which is appropriate since this program is for fairly sophisticated users. There is no internal documentation other than the listing.

Finally, there is the Textwriter manual. It is bound in a loose-leaf notebook, which is nice for updates. Textwriter is sold for North Star and Micropolis systems as well as CP/M, and the manual has sections which are specific to each version. The loose-leaf format is nice because irrelevant sections can easily be removed. This is the only manual with an index, which reflects the fact that Textwriter is the only one of these programs with the ability to automatically generate an index. In my opinion, the clarity of the writing, the examples, and the organization are not as good as in the TEX manual.

Program Operation

Each program operates in basically the same fashion. The file to be printed is prepared using an editor. You can use any editor, but be sure that it stores text character-by-character, rather than using nonprinting codes to compress the text, or you may have trouble. In creating the file to be formatted, you do not have to worry about final appearance since that will be governed by formatting commands which are interspersed in the text. Once the text file is complete, it is saved on a disk, and the formatting program is run. (See figure 1.)

Each program allows the operator to direct the formatted output to either the console or the printer. All but Script-80 also allow the output to be sent to a disk file. Previewing the formatted output on the console is a good idea, but only TPS provides display pauses during previewing. The other systems simulate page feeds by line feeds, with the result that the text jumps off the screen before you have a chance to look at it.

As already mentioned, each system allows interspersing of commands in the text to produce a formatted output. Many of these commands are used to set variables such as page length, margins, etc, which define the basic format of the document. If no commands are provided, certain default values are assumed, for example, a page length of 66 lines.

It would be possible to print many documents without using any formatting commands if these default values could be specified by the user when the system was first set up and if *line breaks* were handled properly. Unfortunately, none of the programs allows you to specify default values, and only TPS handles line breaks in a satisfactory manner. Let me digress a bit on the manner in which line breaks are handled.

Each of the formatters operates in one of two modes. In the *literal mode*, lines of text are printed as they were keyed in. Line breaks occur only where the user has added carriage returns. In the *fill mode*, the formatter generally fills each line to the specified margin,

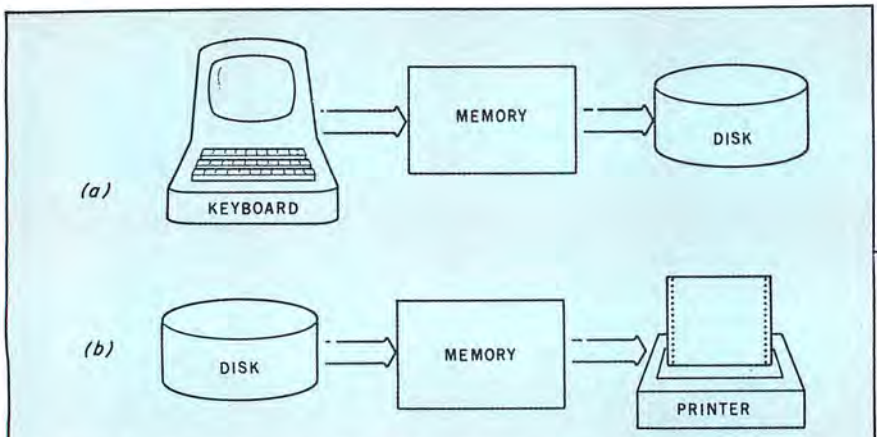

Figure 1: *You use an editor to create and revise your text file (a). Formatting programs (b), such as those described in this article, read the edited text file and print the final document. Formatter commands are interspersed with the text to control its margins, pagination, line spacing, and many other characteristics.*

ignoring carriage returns. Even when operating in fill mode, there are times when a line should be broken—for example, at the end of a paragraph.

Table 2 summarizes the way line breaks are handled by each program in the absence of formatting commands. Since TPS causes a break whenever a line begins with a blank or when a line is totally empty, it is capable of printing documents with no embedded commands, assuming that the default page-layout parameters are suitable. If you begin a paragraph by indenting or put a blank line between paragraphs, there will be a break at the end of the preceding paragraph. TEX comes close to working without commands since blank lines may be used to separate paragraphs. However, page numbering is enabled by default, so a letter composed without commands will have page numbers automatically printed on the bottom. Script-80 also comes close, but since blank lines are ignored rather than passed through to the output, it is not possible to force a signature such as:

Sincerely,

Larry

With Textwriter, files without commands are merely formatted as single, unbroken paragraphs.

By using appropriate commands you may, of course, force line breaks in all of these systems. For example, each has an explicit break command and a start-paragraph command. Both Script-80 and TPS have alternative command prefixes which either cause or suppress line breaks when the commands are encountered.

Program Features

Table 3 summarizes the number of functions in each program according to several categories. These rankings give some indication of the power of the programs, but they should be taken only as first approximations. They are particularly unfair to TPS, since it has been designed different from the others. TPS was modeled after text formatters for larger systems. As such, it is designed to provide a good deal of flexibility and generality for the programmer-user. For example, rather than providing explicit commands for setting page and header margins, the system assumes that you will write macroinstruction sequences to handle them as you desire. (See listing 1.) Therefore, there are fewer primitive commands, but it is possible to emulate most of the commands in the other systems by writing appropriate command programs.

The power of TPS is, therefore, understated in the rankings of table 3; however, the system requires more sophistication on the part of the user. The rankings might also be misleading because they only show the number of features, and say nothing of their utility. Even if a program has few features, it might have one that is quite important to you. With these disclaimers noted, let us look at each of the categories.

Page Layout

Page layout has to do with setting the size of the printed page and the various margins. (See figure 2.) All of the systems are fairly equal here, except that TPS relies on user-supplied programs, so it does not provide as many primitive commands as the others. TEX rates low only because it makes no provision for a footing margin.

Page Control

Most of the page-control features are concerned with forcing or inhibiting page breaks either unconditionally or when certain conditions are met. For example, each system allows you to start a new page if the printing has gone beyond a certain line, or to start a new page at any arbitrary point in the text. They are fairly equal in power, but the edge goes to Script-80 and TPS which have a greater ability to look ahead in the text before deciding whether or not to end a page.

Page and Chapter Numbering

Each system has the ability to automatically count pages and number (or not number) each page. They vary in their ability to place the numbers at different positions on the pages. Textwriter is unique because it keeps track of chapter numbers as well as page

numbers. TPS is unique because it is able to display page numbers as Arabic, lowercase Roman, or uppercase Roman numerals. Again, TPS is at a disadvantage in terms of the number of features, because of its reliance on user-supplied programs to determine page numbering. Even though it has few primitive features, it is possible to provide all of the functions of the others by writing suitable programs.

Page Heading and Footing

Each system is able to place a specified heading line at the top of each new page. This line may or may not include the page number. TPS is unique because its title lines (which may be placed anywhere on the page) may have three parts: one at the left margin, one centered, and one at the right margin. TEX is the only system which is unable to place footing lines at the bottom of each page.

Text Diversion

Text diversion refers to the ability to place portions of the text in storage temporarily for printing at a later time. This is necessary for printing footnotes at the bottoms of pages or accumulating terms for an index or table of contents. Only TPS and Textwriter are able to divert text, in different ways. Textwriter explicitly provides for footnotes, index entries, and table-of-contents entries. It is simple to use. For example, you need only flag a term to have it entered into the index along with the page and chapter numbers in which it was used. A single command will produce an alphabetized index at the end of the article. Tables of contents and footnotes are handled in a similar easy-to-use manner.

TPS is also capable of buffering text for future output, but the programs must be written. This is a good deal more cumbersome for footnotes or tables of contents, and an alphabetized index would be impossible. The advantage to the TPS approach is that you are not stuck with the formats supplied by the system. For example, you could force footnotes to be on even pages only, spread evenly across adjacent pages, separated from the body by a row of asterisks (rather than dashes), numbered (rather than designated by an asterisk), etc. If you want that sort of flexibility, you need to use TPS and build a library of macro programs to produce the kind of footnotes you like.

In creating the file to be formatted, you do not have to worry about final appearance since that will be governed by the formatter.

Paragraph and Line Control

I have already discussed the line-

	S-80	TEX	TPS	TXTW
Break if first character of line is blank	x		x	
Break on empty line		x	x	
Pass empty line through to output		x	x	

Table 2: *With the exception of Textwriter, each program is capable of generating line breaks even if there are no commands embedded in the text. Because of its handling of these breaks and its default parameter values, TPS is capable of printing documents without commands, if the default format is suitable.*

	S-80	TEX	TPS	TXTW
PAGE LAYOUT	2	3	4	1
PAGE CONTROL	1	2	1	2
PAGE AND CHAPTER NUMBERING	2	2	3	1
HEADING AND FOOTING	2	4	1	3
TEXT DIVERSION	N	N	1	2
PARAGRAPH AND LINE CONTROL	3	3	2	1
TYPE AND FONT CONTROL	2	4	3	1
PROGRAMMING	N	N	1	2
DISK OPERATIONS	3	4	1	2
OPERATOR INTERACTION	3	4	2	1
PROGRAM INVOCATION OPTIONS	2	2	1	3
COMMAND SYNTAX	N	N	1	1

Table 3: *The programs are ranked by the number of functions in each category; however, this is not always an indication of relative power. TPS has fewer built-in commands in some categories than other programs, but it is possible to simulate many of those commands using its programming features. Furthermore, even though a program has many features in a category, it may be lacking one that is critical to your application.*

```
.DM HD                      (name the macro program "HD")
.SP 3                       (space three lines)
.TL "Sample Heading Line"   (output the title line)
.SP 3                       (space three more lines)
. .                         (end of macro program)
```

Listing 1: *A short macroinstruction sequence like this is written for TPS to output a heading line and leave a six-line margin. This macro program may then be invoked whenever a certain line is printed or whenever certain conditions (such as the start of an even-numbered page) are met.*

```
.TM 6                       (this command sets the top margin at
                             six spaces)
.HM 3                       (this command places the heading line)
.HE Sample Heading Line     (this command defines the heading text)
```

Listing 2: *For Script-80, TEX, or Textwriter, the top margin and heading line would be set using commands such as these.*

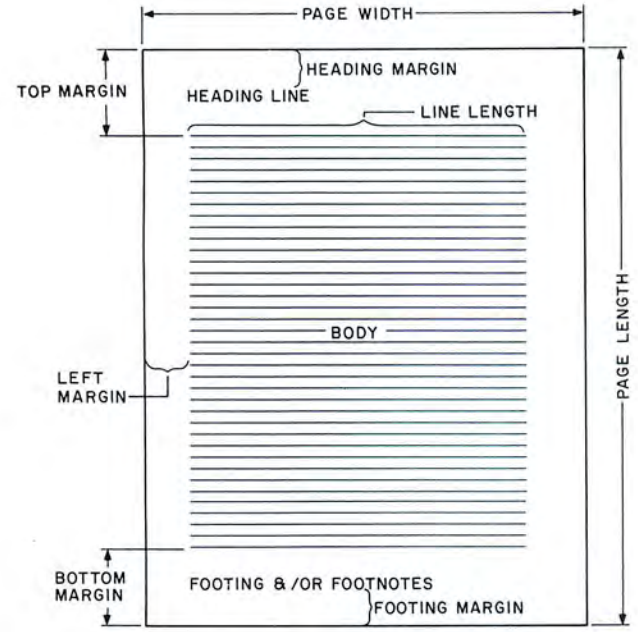

Figure 2: *Each program allows you to set basic page-layout parameters as illustrated here. In each case, lengths are specified in numbers of lines and spaces, rather than inches. All but TEX allow the specification of a footing margin and text.*

breaking and paragraph-designation features included in this category. Each system is capable of printing lines to the nearest word and justifying the lines by inserting blanks between words. Only Textwriter is able to justify by placing equal spaces around each character, if your system has a continuous-spacing printer such as a Diablo, NEC, or Qume. Script-80 makes what I consider a mistake in justification. If a line is too short (for example, the last line of a paragraph) it will be justified if it takes up 75% of a full line. The other systems do not justify such lines. Script-80 produces funny-looking paragraphs with too much blank space in the last lines.

Other features such as automatic indentation of and spacing between paragraphs, tabbing, indenting of text and paragraphs, and varying the spacing between lines fall into this category. Textwriter has a few more features than the others in this area, but as I indicated earlier, its rules for line breaks make it impossible to print simple documents without any commands. Again, many of the features of the other systems could be emulated with user-written routines in TPS.

Type and Font Control

These features deal with the ability to vary character spacing and appearance if your system has a continuous-spacing printer. Although the programs appear to be ranked in order from one thru four, Textwriter is really the only one which makes an effort in this area. With Textwriter, you are able to print super and subscripts, boldface, double-strike characters, underline characters, and select 10 or 12 characters per inch. The same codes as in the WordStar word-processing system are used, so that files created using WordStar can be printed without change. (Textwriter is compatible with WordStar, so WordStar owners who need text diversion and disk operations can use it.)

Script-80 ranks second in this category because it has a pixel mode which enables you to print a crude grey-scale drawing, such as

one made by using a television camera and computer, but you need a lot of patience to define the picture.

Programming

TPS and Textwriter are the only systems with programming features. With TPS, you commonly build up a library of macro programs for processing footnotes, paragraphs, new pages, etc. These macro programs can be invoked when a certain line on the page is reached, when some condition is met, or when they are encountered as commands in the text stream. The system provides for fourteen numeric variables which you may use as you please and thirteen variables used by the system. (See table 4.) You can assign values to user variables, alter them with simple arithmetic expressions, and test them. The operator can also be prompted to supply values for TPS variables. In addition to numeric variables, the operator (or a disk file) can supply values for one string variable. These values are then output with the text and are used for filling in the blanks in forms at print time.

Textwriter is not as general in its programming structure, but it is quite useful for filling in blanks on forms. The system provides for sixteen string variables of up to 32 characters each. These may be referred to by any name you wish rather than by single characters as is the case with TPS. As with TPS, the operator may be prompted to supply values for these variables, or their values may be read from a disk file.

Disk Operations

TPS and Textwriter have more disk operations than the other two systems in order to complement their programming capability.

Each system can print lines to the nearest word and justify them by inserting blanks between words.

Both are capable of reading variable values from a disk file and subsequently putting them in the formatted text. Thus it is possible to use either system in applications such as sending a "personalized" letter to each person in a name-and-address file. The programming power of TPS allows even more flexibility, such as sending letters containing different paragraphs to different groups of people. (The Script-80 manual refers to the availability of a "commercial" version of the program with these features, however, they were not found in the "professional" version which was supplied for review.)

In addition to using a disk file to fill in blanks and control the structure of the forms produced, it is possible, in all but TEX, to integrate material from more than one disk file into a single document. For instance, the chapters of a book might each be a separate edit file, but you would want to print them together when the entire book is finished. In the case of TPS, this concatenation of files is done by the operator when the program is invoked.

Operator Interaction

The operator may interact with each program while it is running. Again, TPS and Textwriter have more features. For example, it is possible to pause during printing to instruct the operator to change forms or print elements, or to request values for variables. Script-80 and TEX merely allow for pausing or stopping the job during printing.

Program Invocation

The operator is able to select from a number of options at the time the formatting job is started. The formatted output can be directed to the printer or console in each system, and to the disk in all but Script-80. TEX allows you to direct any error messages to either the console or the printer, and it is even possible to suppress formatting and only check for errors. As mentioned in the section on program operation, TPS allows you to specify the number of lines on your console, so that formatted output can be previewed before it

CURRENT PRINT COLUMN	CURRENT LEFT MARGIN
DAY OF THE MONTH	CURRENT PAGE LENGTH
END OF DATA FILE FLAG	DIVERSION TEXT LINE COUNT
INPUT STRING CHARACTER COUNT	YEAR
CURRENT INDENT	PAGE NUMBER
CURRENT LINE LENGTH	CURRENT LINE
MONTH	

Table 4: *Variables which are maintained by TPS. The user may cause their values to be printed and may test their values in deciding how to format text. In addition to these, the system provides fourteen user-defined variables and a string variable.*

is printed. Script-80 is unique because the operator can supply a number of text-formatting commands at the time the program is started. Thus it is possible, for instance, to print a document on two different sizes of paper without changing the embedded commands.

The operator may interact with each program while it is running.

Command Syntax

The basic command syntax is similar for each system. Commands must be at the start of a line and must be preceded by a special character. Textwriter uses words such as "break" for commands while the others use two-character abbreviations such as "BR". Only Textwriter allows multiple commands on a line.

TPS and Textwriter allow for some altering of the syntax of commands. Textwriter allows you to redefine the special characters used to signify such things as the start of a command, a tab, an underline, etc. This enables the literal interpretation of what would normally be command characters. TPS achieves the same result by allowing you to temporarily ignore the normal meaning of a control character.

Miscellaneous

Table 5 lists some miscellaneous features found in these programs. The ability to output arbitrary codes to your printer is useful if you wish to take advantage of special features it has. The program sizes shown are for the program itself. The systems which are able to divert text use a buffer that varies in size during execution. The amount of space required is a function of the amount of material saved for footnotes, the index, and the table of contents.

Conclusion

I have attempted to summarize the functions provided by each of these programs. In deciding which is right for you, you should ask what you plan to use it for and how much you will use it. If you plan to use the system for mass mailings, you will need the programming and disk features of TPS or Textwriter. If the degree of flexibility found in Textwriter is sufficient, it will be easier to use, particularly if you do not have much programming experience.

If you will be using the system to produce manuals or reports, the features of Textwriter for footnoting and building indexes and tables of contents will be welcome. Again, this assumes that the format provided is suitable to you. If you plan to do a lot of document composition and revision, I suggest that you consider obtaining a screen-oriented word processor such as those reviewed in the Summer 1980 issue of onComputing. For example, the combination of Electric Pencil for editing individual chapters and Textwriter for printing them as a single book (with an index and table of contents) would be about the same price as many word processors.

If you are able to get by with the somewhat restricted formatting features of TEX, you will find it the easiest to learn and use. It is suitable for either long documents or short correspondence. If you do not need a lot of editing power, any one of these systems, in conjunction with the CP/M line editor, will enable you to print formatted documents at a reasonable cost.■

	S-80	TEX	TPS	TXTW
Output arbitrary codes to printer			x	x
Ignore specified character	x			
POKE values to memory			x	x
Utilize formfeed feature		x		x
Program size (K bytes)	6.75	7.25	7.5	15.75

Table 5: *Miscellaneous characteristics of the four programs.*

About the Author

Larry Press received his PhD from UCLA in 1967. He has worked in industry, in a number of research labs, and taught at several universities. He likes the idea of owning his own tools, so in 1975 he became interested in personal computers. Since that time he has been a consultant specializing in personal computing and has also served as editor of SCCS Interface *magazine and the publication of the ACM Special Interest Group for personal computing. Larry was cochairman of the Personal Computing Festival at the National Computer Conference for 1978 and 1980. His most recent project has been a detailed evaluation of text formatters, out of which this article grew. Readers wishing to obtain more information about the full report should contact the author at the following address: Larry Press, c/o Small Systems Group, POB 5429, Santa Monica CA 90405.*

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Book Reviews

Program Design and Construction *by David A Higgins, Prentice-Hall, 1979, softcover, 189 pages, $9.95*

Review by: Phil Hughes

Program Design and Construction was written to teach structured program design to personal computer users. The design method presented is Warnier-Orr diagramming. This method was developed for large computer systems and until now its techniques have been difficult for the beginner to grasp.

Mr Higgins does an excellent job of presenting these techniques in a manner that is understandable by a newcomer in the computer field. For example, the first Warnier-Orr diagram discussed illustrates what steps are necessary to satisfy the request, "Run down to the grocery store and pick up a loaf of bread, please." At first this may seem unscientific and not related to computer programming, but it is and the parallelism is well developed in the text.

The first part of the book presents the design tools completely independent of any computer hardware and language. In fact, much of the discussion addresses the question of why design and programming should be separate. After ten chapters of methods and examples, chapter 11 addresses common errors made by newcomers to structured design. This is much more than a simple list of errors. It discusses why each error (such as design-a-little, code-a-little) is a problem. Examples of the errors are presented and compared with the correct design approach.

Chapter 12 addresses concurrency, the condition of two or more events occurring at once, neither of which is subset of the other. A method called hierarchy inversion is developed, which is used to solve the problem of handling concurrent events. This method is a simple step-by-step process that reduces concurrent events into a hierarchical structure which can be handled with the tools previously presented. The example used is probably the first one that will be encountered by a business programmer: the fact that a business week is not necessarily contained within a calendar month (or a year, for that matter).

Chapter 13 presents a concept called "Assembly Line Diagrams." This is a technique in which Warnier-Orr diagramming notation is used to illustrate the assembly of something. Both a car and a computerized savings-account report are used as examples. The technique fits each of these equally well.

Finally, two chapters address the process of coding programs in BASIC from Warnier-Orr diagrams. First, some coding conventions are presented and discussed. Next, the BASIC keywords necessary to produce the DO-UNTIL, DO-WHILE, and CASE control structures are presented and discussed. Then, the complete source code for one example, the game of BUG, and much of the source code for the savings-account report program are presented.

The afterword reviews the reasons for using the techniques presented in the first fifteen chapters. It convinced me.

A newcomer armed with this book and a good book on the computer language he or she plans to use will be well equipped to write programs that are both correct and easily maintained. For a professional, the techniques are clearly presented and not tied to any particular language.

This excellent introduction to structured design is the first book in the Prentice-Hall series on personal computing. ■

BASIC: A Self-Teaching Guide *by Robert L Albrecht, LeRoy Finkel, and Jerald R Brown, John Wiley & Sons Inc, 1978, softcover, 324 pages, $6.95*

Review by: Dr Myron A Calhoun

Confucius is reported to have said, "The self-taught person had a fool for a teacher." With the help of this book, that old saying can be laid to rest for good. If you have a need to learn the BASIC language and do not have access to a formal offering of the subject, a careful study of this "self-teaching" guide, with proper attention paid to the examples and self-tests, may suffice.

The book is organized in the usual format for a self-paced course of study: the material is presented in short sections called "frames," each of which presents a small bit of new material and asks a question to test your comprehension. Correct answers are given immediately following the blank line reserved for your answer, so the feedback is both quick and positive. Each chapter begins with a list of objectives

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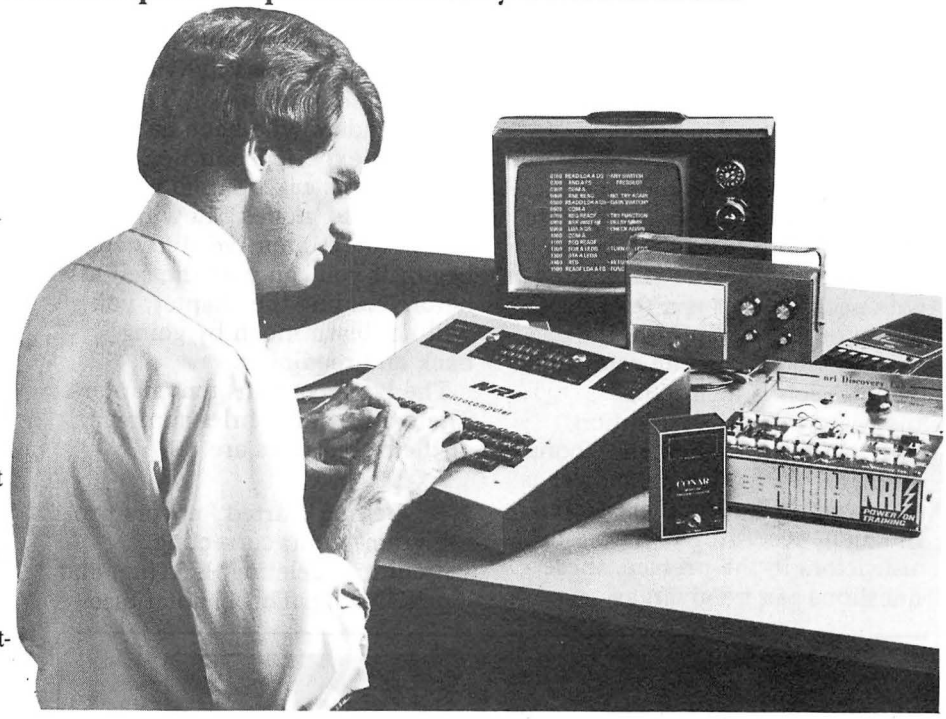

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—what you should be able to do after completing that chapter. At the end of each chapter is a self-test which provides a review of the material presented in the chapter. Answers to these self-test questions are given on a separate page to reduce your temptation to take a "sneak peek." Associated with each answer is a reference to one or more frames in the chapter which you can refer to if the question is missed or answered poorly. In addition, each self-test contains one "bonus problem" for which an answer is not given. In a formal classroom situation, according to a note to instructors in the preface, these questions can be given as assignments to students either as group projects or as individual required assignments.

For readers who have had some previous experience in BASIC, the self-tests can be used as both reviews and guides, showing where more intensive study could begin. If you can pass the self-test before reading the chapter, you will not learn much by going back and reading it.

The book contains ten chapters. Their titles and a brief summary of their objectives are:

1. "Getting Started" covers program input, correcting, editing, deleting, LISTing, and RUNning. This chapter also explains scientific notation, the PRINT and END statements, and the correct notation for arithmetic operations.
2. "Warming Up" covers the concept of a variable and the BASIC statements LET, INPUT, READ/DATA, GOTO, and REMark.
3. "Decision Making" deals with comparison symbols, conditional branching, and the IF-THEN statement.
4. "FOR-NEXT Loops"—the chapter title says it all!
5. "Functions" shows how to properly use the INT, SQR, RND, TAB, and user-defined (DEF FNx) functions as well as the new statements RANDOM and ON...GOTO.
6. "Subscripted Variables" covers arrays and matrices, the DIM statement, and variables with a single subscript. It also presents the MAT ZERO, MAT PRINT, MAT INPUT, and MAT READ instructions which are available in some versions of BASIC.
7. "Double Subscripts" is essentially a continuation of the previous chapter. It is probably broken into two parts to make the self-test easier to manage.
8. "Subroutines" covers the concept of programs within programs and the BASIC statements GOSUB, RETURN, and STOP. With only 19 pages, this chapter is the shortest in the book (chapters 1, 2, 6, and 7 each have more than twice as many pages).
9. "String Variables" covers the application of the BASIC statements DIM, INPUT,

PRINT, READ/DATA, LET, and IF-THEN to string variables. It is noted that not all versions of BASIC have this capability, and that in those which do, the actual forms of the instructions may vary from system to system.

10. "Files" is perhaps the most advanced and difficult concept for beginners to understand, but the material in the frames is presented slowly and clearly. In addition to the concept itself, this chapter covers the statements FILE PRINT, FILE READ, FILES, IF END, and TYP, which are found in some versions of BASIC.

In addition to the self-test at the end of each chapter, there is a final self-test at the end of the book. However, it seems to have been just "thrown in." Although answers are given, there is no attempt to make back-references to either frames or chapters in case a question is missed.

The index which concludes the book is, perhaps, the most disappointing feature of the whole volume: it's just too small. A quick perusal found that the statements NEW, CLEAR, START, and RANDOM (which are discussed briefly in the body of the text as being available on some versions of BASIC) are left out of the index. In addition, some very useful cross-references are missing. For example, under "MAT operations" the instruction MAT READ is omitted, and there is not even a reference to MAT READ under the category "READ statement."

Another omission is even the slightest reference to the PEEK, POKE, and USR functions and the RESTORE instruction. This may be understandable since these statements are not available in all versions of BASIC; but I believe that a brief description of their operation should have been included.

BASIC: A Self-Teaching Guide, 2nd edition delivers what it promises—a relatively good self-taught introduction to the BASIC language.■

Editor's Note: Some omissions stem from the book's orientation toward versions of BASIC that run on large systems, rather than on microcomputers.

Error Message

Error of Omission

One line of type was inadvertently omitted from the article by Jerry Pournelle entitled "A Writer Looks at Word Processors" in the Summer 1980 onComputing (pages 83 thru 87).

At the bottom of page 87, the last line in the left column began as a fragment of a sentence that was meant to read: "*If you do get a terminal system* rather than one with DMA (and terminal-type systems are often more convenient to buy), then please, please make certain you see it in operation with the text editor you intend using."

We apologize for the mental shifting of gears this must have caused for many readers. See also the letter by Charles Strom on pages 10 and 11 of this issue.

Special-Interest Microcomputing Publications

by
William L Colsher

No single publication can possibly cope with the incredible flow of new products and information which is generated within the personal-computer industry. A few general-interest publications cover a wide range of topics quite well, but in-depth information on a particular manufacturer's product is sometimes difficult to find. To help fill this information gap, a number of special-interest magazines are currently published.

These special-interest publications are generally devoted to a particular manufacturer's products or a particular microprocessor. They vary considerably in size and quality, but the need for information in the field is so great that virtually any publisher who can produce on a regular basis is guaranteed a large circulation.

TRS-80 Publications

With well over 250,000 TRS-80 Model I and Model II computers sold, Radio Shack has produced one of the most popular electronic devices of all time. The vast amount of information generated by so many owners, the dozens of add-on products, and the many new programs being introduced keep more than half a dozen magazines going full time.

Following is an alphabetical summary of these magazines. In all cases, I have only commented on publications with which I am familiar.

CLOAD is a cassette magazine that has been in publication since early 1978. It is published monthly on C-30 cassettes and contains both Level I and Level II programs. Back issues are available. Publishing a magazine on cassette seems to be rather difficult. A number of others have folded quickly, evidently due to quality-control problems. *CLOAD* seems to be doing an excellent job.

Insiders is a small publication from Computer Cablevision in Washington DC. It bills itself as a "TRS-80 hardware journal with machine software." It has been in publication for over a year. The review copy I received contained articles on sound generation (along with an excellent though rather limited program), Apparat's NEWDOS, FORTRAN from Microsoft, and FORTH.

The Popular Computing Newsletter bills itself as "the original full service newsletter for Radio Shack TRS-80 computer users." It contains new product information, very readable "Technical Notes," program and game listings, "Questions and Answers," and *no* advertising. The newsletter comes out monthly from Popular Computing Inc, which is independent of Radio Shack. This is a valuable publication for TRS-80 users, especially beginners.

PROG-80 is one of the new publications from The Software Exchange (TSE). The advertisements read, "dedicated to serious programmers...." So far this seems to mean no games, just solid articles on more advanced programming techniques along with a little hardware. The first issue contained articles on string handling, using the INKEY function, and clock routines. Another article covered a simple hardware change to accommodate lower-case characters on the display.

Like other TSE publications, this one has many advertisements. This is not really a problem—one of the reasons I buy magazines is for the ads. However, all the ads are for TSE products or products they carry.

SoftSide is another TSE publication. This one has been around since October 1978 and is published monthly. The emphasis here is definitely on games and some very good ones are published. There are also other "home" type applications along with some programming tips and techniques. The featured program is generally worth the time to type it in. If you don't have time to type, the magazine is available on tape as well.

This publication is more mature than *PROG-80*. The extra months of publication show in terms of quality and variety of articles. I would recommend subscribing to this magazine in lieu of *PROG-80*.

TSE now publishes an Atari version of *SoftSide* along with an Apple edition. The Apple version is quite comparable to the original *SoftSide*: good programs, interesting articles, etc. The Atari version has not yet seen a first issue, but I would expect it to be as good as the other publications from these people.

The Eighty is a new free publication from the *SoftSide* people. The first issue (January 1980) contains product and book

reviews and one feature. But it is mainly advertising for TRS-80 peripherals and software from suppliers other than Radio Shack.

T-PAL is the Programming Amateur's Letter (PAL) and is put out by The Mail Mart. Their advertisements claim that it covers "Level II from the bottom up...." Sample issues are available for $1.00.

I should point out that almost all TRS-80 publications have adopted Level II as the standard dialect of BASIC. Evidently there are too few Level I machines left to make much difference anymore.

TRS-80 Computing is one of two closely linked publications from Computer Information Exchange (CIE). CIE is a nonprofit educational corporation, so *TRS-80 Computing* contains no commercial advertising. Their other publication, *CIE S-80 Bulletin*, is essentially all advertisements and is distributed free to computer clubs and stores.

TRS-80 Computing is published very irregularly. The 24-page magazine contains a large number of letters and short articles on tricks and techniques for the TRS-80 user. While there is no advertising, editorial material from manufacturers extolling their products is published.

TRS-80 Monthly Newsletter has been in business for over a year. They have published quite a few good programs including a "complete income tax program," word-processing software, mailing-list programs for tape and disk, and many more. They have also published some interesting gambling programs including a horse-selection system. Sample issues are available for $4.00 and

you can start your subscription with the first issue (at least for now).

80 Software Critique is devoted entirely to software reviews. The first issue contained more than thirty reviews. Each program is described and rated on a scale from 0 thru 100. They also actively solicit software for review. This is probably a good magazine to subscribe to if you are developing software for the TRS-80.

80-US Journal has been published bimonthly for more than a year. It contains a good mix of programs, reviews, and the usual assortment of ads. The programs seem to be slightly better than many in this class of publication. Programs are printed full size so they are easy to read while you are typing them in.

6502 Publications

The 6500-series microprocessors have often been considered a poor relation by computer hobbyists; especially those experimenters with large 8080- or Z80-based systems. This attitude has not prevented the sales of huge numbers of Apple II computers, KIM, AIM, and SYM single-board systems, and Commodore PET computer systems. The new Atari 400 and 800 computers use the 6502 processor, also. The combined number of these systems probably compares to the number of TRS-80s.

Apple Seed is a new publication from TSE. Prospective subscribers might want to take a look at one of the TRS-80 publications from TSE since, as of this writing, the first issue has not been published.

Compute and *Compute II* address the two main branches of the 6502 family. *Compute* is for the owners of "mainframe" machines: PET, Apple, and Atari. *Compute II* should please owners of 6502 single-board computer systems: KIM, SYM, and AIM.

The old *PET Gazette* now makes its appearance in *Compute* as the PET Gazette section. There are also Atari and Apple "gazettes." The two *Computes* come out in alternate months.

Cursor is a monthly cassette magazine for PET owners. It has gotten excellent reviews in several other magazines. Like *CLOAD*, this is one of the few cassette publications to survive.

IRIDIS is a cassette publication from the same address as *Cursor*, and while it is not earthshaking, it does contain some very valuable material and four nice programs.

Micro is a monthly publication for all 6502 users. It has enjoyed three years of publication and it keeps growing. While recent issues have averaged 80 slick pages, the July issue is over 100 pages. I recommend this magazine to any 6502 user. It contains excellent articles and programs, as well as advertisements which do not appear in the general-interest magazines. A unique feature of *Micro* is the three-hole punching along the left side so that it can be filed in a standard binder.

Text continued on page 66

This survey is certainly not complete. New magazines come into being almost monthly and many disappear almost as quickly. If you are interested in one of the magazines I have mentioned, I strongly recommend that you buy a sample issue before subscribing. Better still, try to find someone who has already subscribed through a local computer club.

If you have not read about a magazine that interests you, do not despair. As I said before, there are new ones coming out all the time. The general-interest magazines are a good place to look. For example, in *BYTE*'s monthly "Clubs and Newsletters" section you will usually find two or three new newsletters along with information about computer clubs all over the world.

Addresses and Rates

Apple Seed — $15.00/12 issues
POB 68
Milford NH 03055

BUSS — $8.75/12 issues
325 Pennsylvania Ave SE
Washington DC 20003

CLOAD — $36.00/12 issues, $20.00/6 issues
POB 1267
Goleta CA 93017

Compute and **Compute II** — $9.00/6-issue year
POB 5406
Greensboro NC 27403

Computer Shopper — $10.00/12 issues
POB F
Titusville FL 32780

Cursor POB 550 Goleta CA 93017	$33.00/year $20.00/½ year $3.95/sample issue
Insiders 2617 42nd St NW #2 Washington DC 20007	$39.95/12 issues $14.95/4 issues $4.95/sample issue
IRIDIS POB 550 Goleta CA 93017	$7.50/6 issues $2.00/sample issue
Micro POB 3 S Chelmsford MA 01824	$12.00/12 issues
Peelings II 945 Brook Cir Las Cruces NM 88001	$15.00/6 issues
PET Newsletter Computer Project Lawrence Hall of Science University of California Berkeley CA 94270	$4.50/6 issues
PET User Notes POB 371 Montgomeryville PA 18936	$6.00/6 issues
Popular Computing Newsletter POB 16875 Plantation FL 33318	$24.00/12 issues
PRINTOUT Greenacre, North Street Theale, Berkshire RG7 5EX UK	£14.50 (about $35.00)/ 10 issues
PROG-80 POB 68 Milford NH 03055	$15.00/6 issues
The Recreational Programmer POB 2571 Kalamazoo MI 49003	$12.00/year bimonthly
Robert Purser's Magazine POB 466 El Dorado CA 95623	$12.00/4 issues $4.00/sample copy
Robotics Age Robotics Publishing Co 5147 Angeles Crest Hwy La Canada CA 91011	$8.50/year quarterly

Addresses and Rates

SoftSide POB 68 Milford NH 03055	$15.00/12 issues
Source World Source Telecomputing Corporation 1616 Anderson Rd McLean VA 22102	$2.00/single issue
S-100 Microsystems POB 1192 Mountainside NJ 07082	$2.00/sample issue
SS-50 Newsletter POB 402 Logan UT 84321	$12.00/6 issues
T-PAL The Mail Mart POB 11102 San Francisco CA 94101	$24.00/year $1.00/sample issue
TRS-80 Computing CIE POB 158 San Luis Rey CA 92068	$15.00/12 issues
TRS-80 Monthly Newsletter Computronics POB 149 New City NY 10956	$24.00/year $4.00/sample issue
6502 User Notes POB 33093 North Royalton OH 44133	$13.00/6 issues
68 Micro Journal 3018 Hamill Rd Hixson TN 37343	$14.50/year $26.00/2 years $36.50/3 years
80 Software Critique POB 134 Waukegan IL 60085	$24.00/year quarterly $7.00/single copy
80-US Journal POB 7112 Tacoma WA 98407	$16.00/year bimonthly $31.00/2 years $45.00/3 years $3.00/sample issue

If you're into home video ...Now get into

Questions and Answers.
Every month, technical and non-technical problems solved by experts. Example: 20 questions answered on video discs.

Which Camera Should I Buy?
When you start making your own programs — a detailed report on the specs, prices, special features of more than 35 makes of color and B&W cameras on the market.

What's On Tonight?
— or today? Regular program guide to best network, PBS, Pay-TV shows for the month ahead.

Design for VCR Living.
Whether "VC" means "very comfortable" or "very chic," how to design and decorate around your new home entertainment center. In full color.

The Taping Game.
Interviews with VCR owners around the country, "just plain folks" and celebrities. What they tape, and why.

75 Sources for Videocassette Programs.
Complete listing of practically everything available, feature films, children's programs, lessons, X-rated, sports, classics, etc.

Tape Me Out to the Ballgame.
How network sports directors shoot a game. Rules for major league parks. Little League — make your own rules.

...the magazine that spearheads today's revolution in home entertainment, communications, lifestyle!

If you got a VCR for Christmas—or if you've subscribed to cable or pay TV—or if you've added projection TV in your game room—or if you've become a fan of video games—

—or if you're just on the verge of joining the more than 2,000,000 U.S. families who are already enjoying the fun and benefits of this great new communications technology—Home Video magazine is the one magazine that brings you all the news and information you need to get the most out of your equipment.

On these pages you'll see just a sampling of what readers are finding in Home Video (the first issue was a smash-hit on the newsstands) and what they have to look forward to in the exciting issues ahead.

Then, if you decide as hundreds of thousands of readers already have, that Home Video is for you, simply use the insert card—with a money-back guarantee if you're not completely delighted!

...Or use this full money-back guarantee coupon.

HOME VIDEO
P.O. Box 2651, Boulder, Colorado 80322

5OC8

Please send me the next 8 issues of Home Video, for which I attach my check for $9.97. However, if at any time I am not completely delighted with the magazine, I may cancel my subscription, and you will refund the cost of all remaining issues.

Name

Address

City State Zip

Circle 130 on inquiry card.

Peelings II is a new publication (May-June 1980) specializing in Apple II software reviews. It will appear six times a year and contain about twenty software reviews. Each program being reviewed is described, various features discussed, and it is rated on a standard from AAA (absolutely astounding) thru F (useless trash). The highest rating in the first issue was AA (top-notch, superb) and the lowest was D (very bad software). This appears to be an important publication for Apple users who want objective software evaluations and comparisons on which to base their purchases.

PET Newsletter is put out by the Lawrence Hall of Science Computer Project people. Checks for subscriptions should be payable to the Regents of the University of California.

PRINTOUT is a new (January 1980) British publication for PET users. *PRINTOUT*, according to editor Richard Pawson, "is a fully interactive system. We collect information from manufacturers, programmers, and users, then distribute it to our readers in the form of well-written articles for the novice and experienced hacker alike." On the basis of examining the May issue, this would seem to be the case. It comes out ten times a year and consideration is being given to American distribution, but at present it must be ordered from England.

6502 User Notes has been in publication for over three years. It publishes some very good articles. These have included a pulse-type telephone dialer, a 32 K-byte memory board you can build for $200, several assemblers, and quite a lot more. Sample excerpts are available.

Miscellaneous Publications

These last nine magazines have been relegated to this category because they do not fit in the other two.

BUSS is the independent journal for Heathkit computer owners. It has been published since Heathkit began producing small computers, and was recommended to me by a friend who subscribes.

Robert Purser's Magazine of Computer Cassette Reviews is a quarterly publication running about 112 pages. It is filled with excellent reviews of current software for the three major computers: Apple II, PET, and TRS-80.

Sections deal with new product reviews (well illustrated with photographs of video displays), game reviews done by young people at the Marin Computer Center, a software directory (23 pages of very fine print), a list of recommended cassettes from past issues, and a list of "classics" (games or programs so good that everyone should have a copy).

I recommend this magazine to anyone who buys a lot of software or to any person starting out in the field who is feeling lost over what to get for the system.

Computer Shopper is a tabloid-size publication that contains listings of used computer equipment for sale. It is published by Patch Publishing Company, which also prints the similar *Shutterbug Ads* for photographers.

The Recreational Programmer's title is somewhat misleading. You won't find any run-of-the-mill games here. This bimonthly magazine is more akin to Martin Gardner's "Mathematical Games" column in *Scientific American*. Also included are programming tips and reviews. Issues are currently 32 pages long.

Robotics Age is, shall I say, somewhat esoteric. Unless you are really into robots, you will not find much to interest you. It is definitely not for the casual reader. This is probably the only place you will see an advertisement for jet pipe servo valves. Interestingly, Robert Tinney, who's done so many excellent *BYTE* covers, is the art director for *Robotics Age*.

SS-50 Newsletter for 6800 and 6809 users is a new publication (January-February 1980). It contains articles on hardware and software, information on new products, and question-and-answer columns. The editor, Ken Orme, intends it to "provide documentation that will keep your system going and up-to-date." It is published six times a year and a free sample issue is available on request.

68 Micro Journal is also for users of the 6800/6809 microprocessor. Averaging over 50 pages per month, this magazine contains reviews, programs, and hardware articles concentrating on the Southwest Technical Products Corporation machines.

S-100 Microsystems has appeared so, after five years, S-100 users finally have a magazine of their own. Sol Libes, a strong advocate of the S-100, is the editor. (See "Profile of Sol Libes," Winter 1979 onComputing, page 68.)

Source World is a slick user's group newsletter for subscribers to The Source, the telecommunication/information utility. It contains articles on the different ways people are using The Source system, information on new services, and tips on using old ones more effectively. If you are interested in signing up for The Source, this might be a good magazine to look over before you invest $100.■

Error Message

Floppy Errors

Two errors occurred on page 12 of the Summer 1980 onComputing in the article "Understanding Floppy Disks." The index-timing pulse occurs once every 200 milliseconds, *not* microseconds. Also, the floppy disk shown diagrammatically in figure 2 is an 8-inch disk, not a 5-inch disk. Our apologies for these errors.

Product Review

The New WpDaisy:

by Bob Magruder

In my previous life as a consulting engineer, I searched for a way to produce reports efficiently and quickly. It seemed that every job was late, getting later, and in need of extensive revisions. When deadlines were met, errors were always found during collation. Corrections required additional typist and reproduction-machine operator time. The overtime skyrocketed, the boss screamed, and life was generally unbearable.

Data input is divided into system data: present date, portfolio name, and market index; and transaction data: ticker symbol, date of purchase, purchase price, market index at purchase, current yield, current price earnings, and current price.

The program is menu driven with nine menu options:

1. Update System Data
2. Add Items
3. Update Current Price
4. Edit Transaction Data
5. Record Stock Dividends
6. Record Stock Splits
7. Delete Transactions
8. Display Report Index
9. Write to Disk/Tape & Close System Down

The disk system supports a printer and sort routines for reports. Sorts available are:

1. Alphabetic by Ticker Sym
2. $ Market Value
3. $ Estimated Yield
4. Dollar Gain/Loss
5. % Gain/Loss
6. % Earnings Incr./Decr.
7. % Yield on Market Value
8. Ann. Retr. on Invest.

Word-Processing Software

Recently, as a systems consultant in my own firm, I had to do something about report generation. We write articles for magazines, system-evaluation reports, and complex system-progress reports. Unless these accompany our invoices, we do not get paid. In a small business, holding up the cash flow for several weeks while reports are generated several times can be disastrous.

As a remedy, we elected to use the I/OS operating system and the WpDaisy word processor on our Dynabyte DB 8-2 computer. Our printer is a letter-quality NEC Spinwriter with a 2 K-byte printer buffer. We have 48 K bytes of memory for the system programs, WpDaisy, and text, which allows us to work on files as long as 20 K ASCII characters. Larger reports are divided into 20 K sections, then printed from a "batch print" file as a single job. In this manner, we produce reports up to 100 pages in one pass. Files as large as 134 K characters have been printed in less than an hour.

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8. Ann. Retr. on Invest.

Figures 1 and 2: *A work draft (figure 1) need not be retyped in order to produce a final draft. Only the changes need to be proofread, then a final version (figure 2), which is right justified and indented, can be produced.*

An Improved Version

WpDaisy has been as "bug"-free as can be expected of a program of its size and complexity. It has been supported extensively by the authors, Infosoft Systems.

Our main complaint with the earlier versions of WpDaisy had been with the documentation and the lack of amenities needed for people to comfortably use the program. About six months ago, we were glad to hear that a revised and "humanized" WpDaisy was being tested.

We have now had the new software and documentation for about three months, both in the Dynabyte version and a new Radio Shack TRS-80 Model II version, and are extremely pleased with what we have found.

The documentation is far better than it has been, showing the benefit of professional writing and editing. It is also completely cross-indexed so that all of the commands can be found quickly. Summaries of commands are printed on a card which can be kept with the machine and included in the software so they are accessible from anywhere in the text.

We have found that the new WpDaisy is far easier to use than previous versions. Our experience

in training new operators has been very favorable.

What Is a Word Processor?

A word processor is a program or set of programs which allows the operator to change or correct text files and then format them for printing. Primitive word processors allow one set of commands to govern the printing of the entire text. More sophisticated word processors allow for changes in the text format as printing progresses by placing commands in the text body. The commands are written to a disk-storage device along with the text. All word processors have methods for manipulating text on the video screen.

The WpDaisy Word Processor

WpDaisy is very sophisticated word-processing software. A *dynamic* video-screen editor permits simple entry and correction of all types of documents. Revisions are easy using the editor and the full screen PREVIEW function which shows text as it will look on the printed document. The effect of revisions can also be reviewed on the video display prior to printing. Relatively error-free drafts, manuscripts, and letters can be produced either right justified or with a ragged right margin. A section of a work draft is shown in figure 1.

When used with a letter-quality printer, the formatter sets up a line with even spacing between all of the words in the line.

You don't have to retype the entire text, just the corrections. Since it is not necessary to retype an entire page to make a clean correction, only the changes from the draft to the final copy need to be proofread. The formatted work from the draft (in figure 1) is shown in figure 2. Finished work is shown in figure 4.

Standard forms and clauses are created and stored on a disk and either used as a format *image* or included in the text at printing time by means of a READ statement. For example, standard pages of a proposal can be stored on any disk in the system and printed along with pages that change from proposal to proposal. Eliminating the retyping of this "boiler plate" has saved us hundreds of dollars. It also lets us concentrate on the problem at hand, freeing us from tedious but necessary detail.

Our letter image is shown in figure 3. This image is stored on the work disk and called by the operator to type a letter. The letter produced by using the image is shown in figure 4.

"Humanizing" WpDaisy

WpDaisy's disk-handling capabilities have been greatly expanded. Using the word processor, the operator can:

- change disks in logged-in drives
- list directories of all disks in the system by file type
- write files to any disk in the system
- review any files on the display
- automatically create backup documents while writing to a file
- delete any or all disk files

The editor and formatter, discussed below, feature changes that keep the operator out of trouble, inform the operator about what is going on in the editor, or extend the editing or formatting functions. The changes and expansions *humanize* the software greatly.

```
PERSONAL FINANCE SYSTEMS

          May 8, 1980


.0mt
.0ha
.-pb
.0MP
.0F

[LF]
NAME
COMPANY NAME
ADDRESS
CITY, ST, ZIP
[LF]
SALUTATION:
.5mp
.1f
[LF]
BODY OF LETTER
.0f
.0mp
[LF]
TABLE
[LF]
.1f
.2mp
[LF]
MORE TEXT
[LF]
.0F
.0MP
Very Truly Yours,
[LF]
[LF]
[LF]
[LF]
Robertson B. Magruder,Jr.
Principal
[LF]
[LF]
CC:
ENC:
```

Figure 3: *The format image of the business letter of figure 4. This shows a list of the various parts of the document and specifies the form in which each part is to be printed.*

Figure 4: *This is the finished printout of the letter. The stored text of the letter is processed according to the specifications of the format image.* →

AVS

GROUP

a-v systems group

PERSONAL FINANCE SYSTEMS

Jerry B. Little
MOUNTAIN REALTY, Inc.
Bondville, VT 05340

May 8, 1980

Dear Mr. Little:

The Investment Management System is Module 1 of a ten program series for investors presently being developed by PFS. It is presently available for TRS-80 Model I 16k Tape or 32k Disk machines.

Module 1 is the Data Base Management System for the series. It has been modified to provide a data editor as a front end and a report generator as an output end.

Data input is divided into system data: present date, portfolio name, and market index; and transaction data: ticker symbol, date of purchase, purchase price, market index at purchase, current yield, current price earnings, and current price.

The program is menu driven with nine menu options:

1. Update System Data
2. Add Items
3. Update Current Price
4. Edit Transaction Data
5. Record Stock Dividends
6. Record Stock Splits
7. Delete Transactions
8. Display Report Index
9. Write to Disk/Tape & Close System Down

The disk system supports a printer and sort routines for reports. Sorts available are:

1. Alphabetic by Ticker Sym
2. $ Market Value
3. $ Estimated Yield
4. Dollar Gain/Loss
5. % Gain/Loss
6. % Earnings Incr./Decr.
7. % Yield on Market Value
8. Ann. Retr. on Invest.

JOINING ART AND SCIENCE IN THE SERVICE OF MAN

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?	Status message. Displays: • current file and disk • special character assignments • current find string and count • memory used and remaining
?B	Buffer list. Displays buffer usage.
?D	Disk list. Displays all files or specified file matches, on any disk in the system.
?F	Displays contents of specified file or buffer.
?H	HELP. Displays command summary.

Table 1: *The query functions in the new WpDaisy can be called from anywhere in the program. Calling these functions does not change the text being edited.*

Editor Additions

Query functions (see table 1) are supplied in the new editor so that you can determine the status of the processor from inside the program. These functions may be called at any time from any place in the text without changing the text.

FIND/REPLACE: This function has several options in the new version. One option steps through text, displaying each match and the surrounding text. The operator may choose to replace, move to next match, or end the search.

TYPE-AHEAD BUFFER: The newly designed keyboard buffer captures and stores characters entered faster than the display is updated. Even the fastest typist cannot outrun the WpDaisy now.

ON-SCREEN INSERT TOGGLE: A new mode toggle (^T) allows direct insertion of text on the screen. The update of text in the user area is immediate. Control characters can be inserted directly into the text in this insert mode. Deletions of text can also be made in this mode either through editor or screen commands.

BULK-INSERT: The bulk-insert function now clears the screen from the current cursor position for direct insertion, leaving the balance of the text on the screen. The operator no longer needs to look at a blank screen and wonder where in the text he or she is. Exiting the bulk-insert returns the cursor to the insertion-start point rather than the beginning of the text. This is much more convenient since you usually edit to a point, insert a paragraph or two, and then continue editing.

LINE-CANCEL: This new function deletes all characters from the current cursor position to the end of the current line. The line-cancel works for any insert mode from anywhere in the text, including the control line.

WORD-CANCEL: This new function deletes all characters from the current cursor position to the end of the current word.

BACK-TAB: The back-tab function moves the cursor left through one tab zone. After using WpDaisy for a while, you will discover some tricks to make the cursor zoom around the screen in the edit mode. The carriage return places the cursor at the beginning of the line. The tab key moves the cursor completely across the screen in ten keystrokes. Now you can speed backwards as well as ahead with the new back-tab. This is a very convenient function.

SCROLLING: This new feature allows vertical scrolling, one line at a time. With the old WpDaisy, you could only move the cursor to the bottom of the screen before going to the control line to change screens. With the new WpDaisy, moving the cursor down a line at the bottom of the screen initiates scrolling so that the new line appears.

CLEAR-FILE: This new function allows deleting files from any disk. This is dangerous. Mistakes can and will happen; however, because WpDaisy creates backup files with each revision, the ability to clean up disks by erasing old backup files was included. Those who manipulate large files in the word processor will appreciate this feature.

VERSATILE PRINT COMMAND: The new print command allows printing a variable number of pages, starting or ending with any page number. This allows reprinting page 9 of a 35-page document without printing any additional pages.

ERROR MESSAGES: The new error-message routine prints error messages in English so the operator can understand them. This is a continuation of the WpDaisy command philosophy which uses the first letter of the command word for most of the single-letter command mnemonics. (R = Read and W = Write in WpDaisy.)

Formatter Additions

AUTO HYPHEN: The auto hyphen prints embedded hyphens when the formatter places a hyphenated word in the specified hyphen zone. It does not print the hyphen unless the word is formatted into this zone on printing.

SIMULTANEOUS PRINT: This is an optional program, presently available only for use with the I/OS operating system. The print-spooler feature allows documents to be printed while editing continues either on the same or another item. By using the spooler, the operator may continue working during the printing session.

OPERATOR PAUSE: The operator pause allows an automatic pause in output at specified points in the document. A message or instruction may be displayed on the video screen. This pause may be necessary for manual paper supply or typeface changes.

TAB RULER: The new tab ruler allows designation of tab stops within a section of text or for the entire document. The tab ruler is very useful when working with columnar material in tables. An example of a finished text table produced by the word processor is shown in table 2.

EXTENDED PRINTER CONTROL: Extended printer control utilizes special printer capabilities:

- Bold Print (both overstrike and offset)
- Superscript
- Subscript
- Print Red (ribbon shift)

Necessary Environment

The WpDaisy can be used on most I/OS or CP/M-type Z80 or 8080 disk systems with a minimum 32 K bytes of memory and a video terminal with direct cursor-addressing capabilities. Files of limited size may be handled in a 32 K machine. A 48 K-byte memory is recommended for extensive use. A special version of the word processor is needed for CP/M systems to allow full use of the WpDaisy's cursor-

The Report Generator produces four reports. These are outlined below:

1. PORTFOLIO DATA REPORT

			Purchase			Current		
Symbol	PurDate	Shares	Price	P/E	M.I.	Yield	P/E	Price

2. PORTFOLIO VALUE REPORT

Symbol	Shares	PurVal	MktVal	%Port	Est$Yield

3. PORTFOLIO GAIN REPORT

Symbol	PurDate	L/TGain	S/TGain	DaysToL/T	%M.I.

4.EARNINGS/ROI REPORT

		Total		Annualized % Chg			Annualized %	
Symbol	%Earn	%Earn	MoHld	%Earn	%M.I.	%Gain	%Yield	%ROI

Each transaction is handled separately. 36 transactions can be stored in a tape file and 72 in a disk file. Multiple files may be stored.

Table 2: *This completed text table was produced by the WpDaisy. The formatter tab ruler facilitates production of such tables.*

ITEM	PRICE	
TRS-80 Model II 64 K	$3995	* From R/S with service
Single-disk drive and unit	$1100	* From R/S with service
Spinwriter 1510 with tractor	$2900	* From Computer Store
I/OS and WpDaisy	$600	* From Infosoft Systems dealer with spooler software training and support
TOTAL	$8595	

Table 3: *The cost of a WpDaisy/TRS-80 system compares well with other word processors. Of course, the total cost will vary with the choice of printer. Radio Shack is abbreviated by "R/S".*

Glossary

Batch print: Printing of data which has been previously generated and stored as opposed to being printed as it is generated.

Buffer: A register between two components, such as between the processor and an input/output (I/O) device, where data are temporarily stored during processing. A buffer may be located in a peripheral device such as a printer.

Format image: A list of codes which identifies the text items to be called from storage and printed in a document, the order in which these items are to be printed, and the format in which they are to be printed (eg: margins, indentations, columns, etc). It is a representation of a document which indicates its form.

Scrolling: The vertical movement of lines on a video display such that the top line disappears and a new line is displayed at the bottom of the screen.

Operating system: A set of programs usually provided with a computer which tell the computer how to assign storage to various data, how to transfer data between different peripheral devices (eg: between a floppy-disk drive and a printer), how to set up various application programs (ie: programs that do something useful in the real world; a word-processor program is an application program) for execution. Computers can be used without operating systems, but such use is difficult. Two operating systems are mentioned in this article: CP/M and I/OS. CP/M is a product of Digital Research Corporation and will run on most 8080 or Z80 computer systems. I/OS comes from Infosoft Systems and is similar in many respects to CP/M.

Parallel interface: A peripheral device such as a printer may be connected to a computer by means of a parallel interface. When a parallel interface is used, data is transferred to (or from) the peripheral device in groups of several bits (ie: binary digits); usually an entire byte (eight bits) is transferred at once. The physical connection usually contains eight wires over which the data flows and several other wires that carry control signals. Very high data-transfer rates may be achieved using parallel interfaces.

Serial interface: In communication of data through a serial interface, the data is transferred a single bit at a time. This is in contrast to parallel communication, where several bits are transferred at once. The most common type of serial interface is called the RS-232C interface, which uses an asynchronous protocol (ie: the data does not have to be sent according to a specific timing schedule). Fewer wires are required for a serial interface, but the data-transfer rate is often slower than for an equivalent parallel interface.

Tractor: Part of a computer printer that pulls the paper past the printing mechanism.

OEM: Abbreviation for "original equipment manufacturer." Identifies a company that buys a computer from another firm, adds programs and/or peripheral devices, and then sells the complete computer system under the trade name of the OEM company.

Cursor: The indicator on the screen of a video terminal that shows where the next character operation (eg: typing a new character) will take place.

addressing capabilities.

I highly recommend the use of word-processing equipment in the modern office. It is a highly efficient way to produce the text required in many businesses. In my experience, a small business cannot afford to be without word-processing capabilities. We have beaten the paperwork tangle in our office *only* by use of this equipment.

WpDaisy has been tested and is greatly improved from the operator's viewpoint. Features have been added which we find to be of great value.

WpDaisy and the TRS-80

The I/OS operating system and the WpDaisy can be combined with the Radio Shack TRS-80 Model II computer (reviewed in Spring 1980 onComputing, page 64). I/OS will support up to eight 8-inch dual-density floppy disks, or it may be ordered for a 32-megabyte hard-disk drive. A Diablo, Qume, or Spinwriter printer may be used with either a serial or parallel interface under I/OS.

The cost of an entire system (see table 3) is about $5000 less than a Lanier system, and it will provide all the capabilities of a computer.

The WpDaisy can be purchased, configured for your computer, through:

Infosoft Systems Inc
25 Sylvan Rd S
Westport CT 06880

Infosoft can also put you in contact with a dealer or OEM in your locality who will install your system and train your operator to use the word processor.■

Let this New Series from BYTE BOOKS™ answer your programming questions

Programming Techniques is a series of collected articles concerned with the art and science of computer programming. The first volume in the Programming Techniques series is entitled **Program Design.** The purpose of the book is to provide the personal computer user with the techniques needed to design efficient, effective, maintainable programs.
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Editor: Blaise W. Liffick

Simulation is the second volume in the Programming Techniques series. Both theoretical and practical applications are included. Particularly stressed is simulation of motion, including wave motion and flying objects, and the use of simulation for experimentation.
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September 22-25, Software INFO, Hyatt Regency, Chicago IL. This is the first national conference and exhibit on packaged software held in the US. For more information, or to reserve exhibition space, call (312) 263-3131 or write Software INFO, Suite 545, 222 W Adams St, Chicago IL 60606.

September 24-27, The 10th Annual Conference of the Society for Computer Medicine, San Diego Hilton, San Diego CA. This conference has been planned for physicians, attorneys, administrators, computer professionals, comptrollers, engineers, nurses, and anyone interested in the use of computers for patient care. Sessions on medical subjects, technical subjects, and contributed papers on new research in computer medicine will be offered. For information, contact Society for Computer Medicine, 1901 N Ft Myer Dr, Suite 602, Arlington VA 22209, (703) 525-0098.

September 25-28, Mid-Atlantic Personal and Business Computer Show, Philadelphia Civic Center, Philadelphia PA. General admission for adults is $5. The show is being produced by National Computer Shows, POB 678, Brookline Village MA 02147, (617) 739-2000.

September 26-27, Classroom Applications of Computers in Grades K Thru 12, Independence High School, San Jose CA. A visit to "Silicon Valley," tutorials, workshops, and exhibits, will highlight this conference. The emphasis will be to inform teachers about the possible uses of computers in all areas of education. Contact Computer-Using Educators, c/o W Don McKell, Independence High School, 1776 Educational Park Dr, San Jose CA 95133.

September 27-28, New Jersey Personal Computer Show and Flea Market—80, Holiday Inn (North) Convention Center, Newark NJ. This show will feature an indoor commercial exhibit and sales area, an outdoor flea market with room for 100 sellers, and forums for all popular hobby computing systems. This show is primarily for hobbyists and small-business owners. The admission price is $4 in advance and $5 at the door. Contact NJPCS, Kengore Corp, 9 James Ave, Kendall Park NJ 08824, (201) 297-6918 after 7 PM.

A TRS-80 Cassette Copy Program

by Steve A Hughes

A program to diminish tape-loading problems and produce backup tapes, as well as an example of a program in one language generating a program in another language.

It is well known to owners of the Radio Shack TRS-80 that its cassette interface is unfortunately sensitive to changes in the output level of the cassette recorder. This is only a minor nuisance as long as all the tapes you load were made on your own system. The problem is at its worst when loading programs purchased from different companies. They may have been recorded at widely different volume levels and will almost never match tapes made by your system.

There are two solutions to this problem: the first is to purchase a device to convert the output of your recorder to a constant level. Such devices work quite well and are available from several sources. They have the disadvantage of adding another box to the system with its power cord and connections, as well as costing from $30 to $90. The second solution is to make copies of all purchased cassettes so they will load at the same volume setting as all the other tapes made by your system. This approach also has the advantage of automatically producing backup copies of your valuable programs.

A copy program is both cheaper (this one should cost you about an hour of your time) and more versatile than the hardware solution to the problem. This program, COPY, was written in machine language and loads as a SYSTEM tape on a 4 or 16 K-byte Level II TRS-80 personal computer. I am not very interested in how most programs work, as long as they do work, and suspect that most other people are the same. I am not, therefore, going into an explanation of how this program works, but will go straight to the matter of how you may use it. (Since some

Listing 1: *This BASIC program is executed to produce a SYSTEM tape of the COPY program, which is in machine language. Thereafter, the COPY program can be loaded to produce copies of other program tapes.*

```
100  REM
110  REM PROGRAM TO WRITE A "SYSTEM" TAPE OF THE
120  REM COPY PROGRAM
130  REM
140    CLS
150    CLEAR 1000
160    S$=""
170    PRINT @0, "STARTING TO CONVERT DATA TO STRING.";
180    POKE 16553,255
190      FOR I=1 TO 207
200        READ N$
210        M=ASC(N$)-48 : IF M > 9 THEN M=M-7
220        M=M*16
230        M$=MID$(N$,2,1) : N=ASC(M$)-48 : IF N > 9 THEN N=N-7
240        N=N+M
250        S$=S$+CHR$(N)
260      NEXT I
270    PRINT @64,"STARTING TO WRITE TO TAPE.";
280    PRINT #-1,S$
290    GO TO 999
300    DATA 55,43,4F,50,59,20,20,3C,C0,EA,42,31,BA,43,3E,3F
310    DATA 32,00,3C,3E,00,CD,2B,00,B7,28,FA,32,02,3C,FE,4C
320    DATA 28,3E,FE,44,28,0B,FE,45,CA,19,1A,FE,53,28,1D,18
330    DATA E2,FD,21,BB,43,3E,00,CD,12,02,CD,87,02,44,4D,FD
340    DATA 7E,00,CD,64,02,FD,23,0B,78,B1,20,F3,CD,F8,01,FD
350    DATA 21,00,3C,06,00,3E,20,FD,77,00,FD,23,10,F9,18,AB
360    DATA FD,21,BB,43,16,30,21,00,00,3E,00,CD,12,02,CD,96
370    DATA 02,DD,21,20,3C,06,07,CD,9B,43,DD,77,00,DD,23,10
380    DATA F6,CD,9B,43,FE,78,28,0C,FE,3C,28,11,3E,45,32,3E
390    DATA 3C,C3,EA,42,CD,9B,43,CD,9B,43,C3,2B,43,CD,9B,43
400    DATA 47,1E,00,CD,9B,43,CD,9B,43,CD,9B,43,10,FB,4B,CD
410    DATA 9B,43,91,20,D7,7A,32,38,3C,14,18,C5,CD,35,02,FD
420    DATA 77,00,83,5F,FD,7E,00,FD,23,23,C9,40,78,2B,43
999    END
```

Listing 2: *The COPY program in assembly-language form; the machine-language form is used by the TRS-80.*

```
                        ORG 42EAH
                SPTR    EQU 43BAH       ;STACK PTR.
                CPTR    EQU 43BBH       ;CHARACTER PTR.
                ;
                ;THIS PROGRAM COPIES OBJECT FORMAT CASSETTES ON
                ;THE TRS-80. THE INITIAL ENTRY POINT IS "STOP".
                ;      S. HUGHES   1/19/80
                ;
42EA  31 BA43   COPY    LD  SP,SPTR     ;SET STACK PTR.
42ED  3E 3F             LD  A,'?'       ;DISPLAY "?".
42EF  32 003C           LD  (3C00H),A
42F2  3E 00     COPYA   LD  A,00        ;LOOK FOR A COMMAND.
42F4  CD 2B00   COPYAA  CALL 002BH      ;SCAN THE KEYBOARD.
42F7  B7                OR  A           ;DID WE GET A CHAR?
42F8  28 FA             JR  Z,COPYAA    ;IF NOT TRY AGAIN.
42FA  32 023C           LD  (3C02H),A   ;YES. ECHO IT.
42FD  FE 4C             CP  'L'         ;LOAD?
42FF  28 3E             JR  Z,LOAD      ;YES.
4301  FE 44             CP  'D'         ;DUMP?
4303  28 0B             JR  Z,DUMP      ;YES.
4305  FE 45             CP  'E'         ;EXIT?
4307  CA 191A           JP  Z,1A19H     ;YES.
430A  FE 53             CP  'S'         ;STOP THE CASSETTE?
430C  28 1D             JR  Z,STOP      ;YES.
430E  18 E2             JR  COPYA       ;BAD INPUT. TRY AGAIN.
                ;
                ;DUMP THE PROGRAM TO CASSETTE.
                ;
4310  FD21 BB43 DUMP    LD  IY,CPTR     ;SET BUFFER PTR.
4314  3E 00             LD  A,0         ;TURN ON CASSETTE.
4316  CD 1202           CALL 0212H
4319  CD 8702           CALL 0287H      ;WRITE LEADER.
431C  44                LD  B,H         ;SET PROGRAM LENGHT
431D  4D                LD  C,L
431E  FD 7E00   DUMPA   LD  A,(IY+0)    ;GET BYTE.
4321  CD 6402           CALL 0264H      ;WRITE BYTE TO CASSETTE.
4324  FD 23             INC IY          ;ADVNACE CHAR PTR.
4326  0B                DEC BC          ;DONE?
4327  78                LD  A,B
4328  B1                OR  C
4329  20 F3             JR  NZ,DUMPA    ;IF NOT DO IT AGAIN.
432B  CD F801   STOP    CALL 01F8H      ;STOP THE CASSETTE.
432E  FD21 003C         LD  IY,(3C00H)  ;CLEAR PART OF SCREEN.
4332  06 00             LD  B,00
4334  3E 20             LD  A,20H
4336  FD 7700   STOPA   LD  (IY+00),A   ;CLEAR A SCREEN LOC.
4339  FD 23             INC IY
433B  10 F9             DJNZ STOPA      ;DONE?
433D  18 AB             JR  COPY        ;MORE COMMANDS
                ;
                ;LOAD A PROGRAM FROM CASSETTE.
                ;
433F  FD21 BB43 LOAD    LD  IY,CPTR     ;SET DATA PTR.
```

people might be interested in reading the assembly code, a complete listing is shown in listing 2.)

First, a description of the program's function: COPY allows the user to load an assembly-language program into the TRS-80's memory and then make as many copies of the program as desired. The program will perform as much error checking as is reasonable on the tapes that it loads. Since the program to be copied must be loaded into memory before it can be copied, you must have enough memory to hold both the COPY program and the program to be copied. This is generally not a

```
4343  16 30            LD  D,30H        ;SET BLOCK COUNT.
4345  21 0000          LD  HL,0         ;SET PROGRAM LENGHT TO 0.
4348  3E 00            LD  A,0          ;START THE CASSETTE.
434A  CD 1202          CALL 0212H
434D  CD 9602          CALL 0296H       ;LOOK FOR LEADER.
4350  DD21 203C        LD  IX,(3C20H)   ;"NAME" SCREEN PTR.
4354  06 07            LD  B,7          ;HEADER LENGTH.
4356  CD 9B43   LOADA  CALL READ        ;GET A BYTE.
4359  DD 7700          LD  (IX+0),A     ;DISPLAY THE CHAR.
435C  DD 23            INC IX
435E  10 F6            DJNZ LOADA       ;KEEP AT IT TILL DONE.
4360  CD 9B43   LOADB  CALL READ        ;GET THE BLOCK TYPE.
4363  FE 78            CP  78H          ;START ADDRESS?
4365  28 0C            JR  Z,LOADD      ;YES.
4367  FE 3C            CP  3CH          ;DATA BLOCK?
4369  28 11            JR  Z,LOADE      ;YES.
436B  3E 45      LOADC LD  A,'E'        ;ERROR!
436D  32 3E3C          LD  (3C3EH),A    ;LET THE USER KNOW.
4370  C3 EA42          JP  COPY         ;STOP LOADING.
                 ;
                 ;READ THE "STARTING" ADDRESS.
                 ;
4373  CD 9B43   LOADD  CALL READ        ;GET LSB OF ADDRESS.
4376  CD 9B43          CALL READ        ;GET MSB OF ADDRESS.
4379  C3 2B43          JP   STOP        ;FINISHED.
                 ;
                 ;READ A "DATA" BLOCK.
                 ;
437C  CD 9B43   LOADE  CALL READ        ;GET BLOCK LENGHT.
437F  47               LD  B,A          ;SAVE LENGTH.
4380  1E 00            LD  E,0          ;CLEAR CHECKSUM.
4382  CD 9B43          CALL READ        ;GET LOAD ADDRESS.
4385  CD 9B43          CALL READ
4388  CD 9B43   LOADF  CALL READ        ;GET A DATA BYTE.
438B  10 FB            DJNZ LOADF       ;DONE?
438D  4B               LD  C,E          ;SAVE OUR CHECKSUM.
438E  CD 9B43          CALL READ        ;GET BLOCK CHECKSUM.
4391  91               SUB C            ;ARE THAY THE SAME?
4392  20 D7            JR  NZ,LOADC     ;NO! WE HAVE AN ERROR.
4394  7A               LD  A,D          ;OUTPUT BLOCK COUNT.
4395  32 383C          LD  (3C38H),A
4398  14               INC D            ;INCREMENT BLOCK COUNT.
4399  18 C5            JR  LOADB        ;LOOK FOR NEXT BLOCK.
                 ;
                 ;READ AND STORE A BYTE.
                 ;
439B  CD 3502    READ  CALL 0235H       ;GET A BYTE.
439E  FD 7700          LD  (IY+0),A     ;STORE IT.
43A1  83               ADD A,E          ;UPDATE CHECKSUM.
43A2  5F               LD  E,A
43A3  FD 7E00          LD  A,(IY+0)     ;GET THE BYTE BACK.
43A6  FD 23            INC IY           ;ADVANCE DATA PTR.
43A8  23               INC HL           ;COUNT THE BYTE.
43A9  C9               RET
                       END
```

problem since the COPY program occupies only some 200-odd bytes. The program gives the user the following commands:

- L, the Load command, will cause the COPY program to read a program from cassette into memory. The familiar two asterisks will appear in the upper right-hand corner of the screen when data is found. At the same time, the program's name will appear on the top line of the screen preceded by the letter U. As the program loads, a character will be written on the top line of the screen to indicate

article policy

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that a block has been loaded without any detected errors. This character will change as each block loads. If an error occurs, the left-hand asterisk will be replaced by the letter E.

- S, the Stop command, is used to stop the cassette after a load error. The top part of the screen will be cleared and the COPY program will return to the command mode. This command is intended to allow you to let the cassette run past the end of the program before stopping. Some TRS-80 recorders have the habit of writing a noise pulse on a cassette when the recorder is stopped.
- D, the Dump command, will cause a copy of the program to be written to the cassette. No indication of activity will be seen except the turning on of the recorder. When the copy is complete, the cassette will stop and the COPY program will return to the command mode.
- E is the Exit back to the BASIC interpreter.

You now know how to use the program. The next thing is to make a copy of it for your own use.

There are few good ways of producing an assembly-language tape from a magazine article. The one I have chosen seems to be the simplest. You can use the short BASIC program in listing 1 to produce the program tape.

When you have entered and carefully checked all the data, ready a cassette to record in the recorder and RUN the program. The BASIC program will first build a long string of characters from the DATA statements, then write the string to the cassette. This is your copy of the COPY program. Before proceeding to the next step, it might be a good idea to save a copy of the BASIC program in case you need to use it again. (You can do this by readying another cassette to record and then typing CLOAD.)

All right, you now have an assembly tape of the COPY program. The thing to do is to test it. Rewind the COPY-program cassette and ready it to play. Enter the SYSTEM command. Respond to the *? prompt with COPY. The program should now load. (If a load error occurs, you may have a bad tape or you may have entered the BASIC program incorrectly. Return to "Go" and start again.) When the system returns with the *? prompt, enter /. You should now have the top few lines of the screen clear except for a ? in the upper left-hand corner. The COPY program is now loaded and ready for use.

You might want to copy the COPY program. Rewind the cassette to be copied, and with the play switch depressed enter the L command. The cassette should start, and soon after the program name preceded by a U (UCOPY if you are copying COPY) should appear along with the asterisks. The cassette will stop soon after and the screen will be cleared once more. This means the program loaded correctly. Now put another cassette in the recorder and set it to record. Then enter the D command. The cassette will start and run for a short time. When it stops, enter the E command. You will have just copied your first program and returned to BASIC.

You are now in a position to copy all your tapes and thus get around the volume sensitivity problem at the same time that you produce backups for your programs.■

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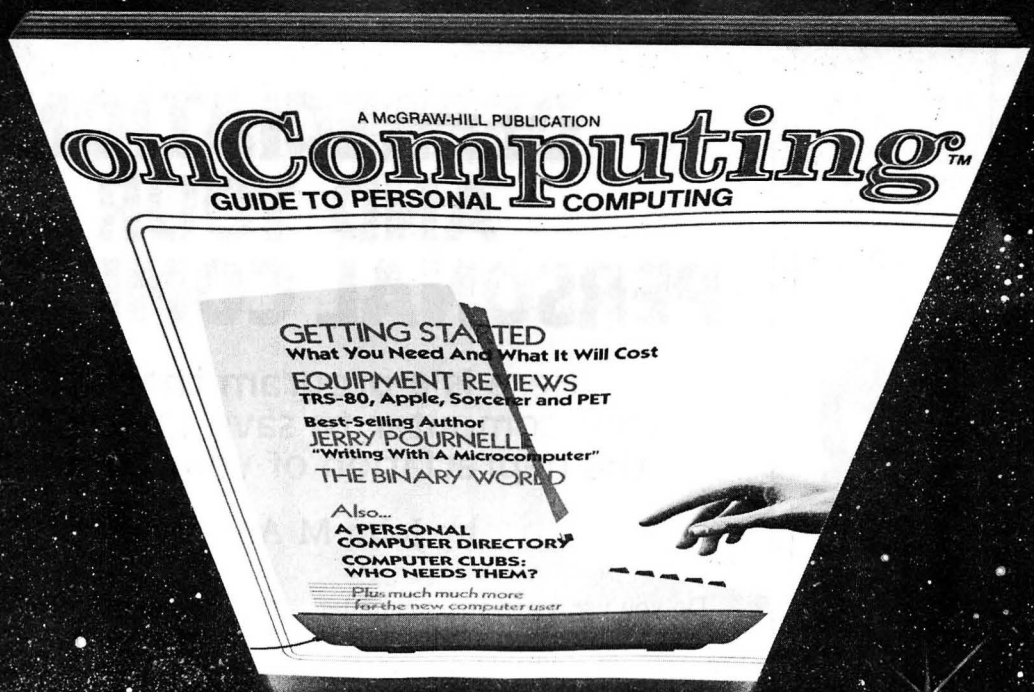

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7OC80

onBusiness

DEPRECIATION AND YOUR PERSONAL COMPUTER

Here is a program that uses your computer to save tax dollars on the depreciation of your computer.

by John M Anderson

Do you use a personal computer in your business or profession? If so, you are probably depreciating it, as the law allows, in order to recover your initial capital investment. Have you thought carefully about the method of depreciation you are using? You may be paying higher taxes because of your choice of methods. Even though economists say that higher taxes tend to cool an overheated economy, it is doubtful that you should try to lick inflation on your own. Furthermore, you probably do not even want to try! Most of us just want to stay even. By choosing the appropriate depreciation method, you will help yourself stay even—maybe even move ahead.

Methods of Depreciation

The Internal Revenue Service allows the use of any of several methods of depreciation classified as either *straight-line* or *accelerated* methods. If the straight-line method is used, you can depreciate your system in equal annual increments. These are determined by dividing the difference between the initial cost and your estimate of the salvage value by the number of years of useful system life. For example, if you paid $2000 for your system and estimated a five-year life at the end of which you guess the system will be worth $500, then the annual depreciation would be ($2000 – $500)/5 or $300.

There are several allowable methods which accelerate the recovery of your capital. The two most common methods are called *double-declining-balance* (DDB) and *sum-of-years-digits* (SYD) methods. No matter which method you choose, the total amount to be depreciated over the life of your system will always be the cost-minus-salvage value.

Double-declining-balance uses twice the straight-line rate applied to the remaining book value each year, where book value is cost minus total depreciation taken to that point. Using the above example, the first year's depreciation would amount to two-fifths of $2000, or $800; the second year's depreciation would amount to two-fifths of $2000 – $800, or $480; the third year's depreciation would amount to two-fifths of $2000 – $800 – $480, or $288; and so on. Remember that accumulated depreciation cannot exceed cost-minus-salvage value. It is permissible to switch from an accelerated method to the straight-line method at that point where straight-line depreciation of the remaining book value results in larger amounts earlier.

The sum-of-years-digits method applies a fraction to the cost-minus-salvage value each year. That fraction is a part of the sum of the digits from 1 thru the number of years of service life. For example, if the service life is five years, that sum is:

About the Author

John M Anderson is an Associate Professor of Business Administration at the University of North Carolina at Wilmington. He teaches courses on Computer Applications in Business and on Quantitative Methods.

```
310  A = A + D2
320  T = T0 * (1 + G)↑ I
330  T(1) = T - D1
340  T(2) = T - D2
350  FOR K = 1 TO 2
360  FOR J = 2 TO 16
370  IF T(K) < M(J) THEN 390
380  NEXT J
390  T(K) = (N(J) + L(J)*(T(K) - M(J - 1)))
400  T(K) = T(K)/(1 + R)↑ I
410  S(K) = S(K) + T(K)
420  NEXT K
430  NEXT I
435  PRINT
436  PRINT "PRESENT VALUE OF TAXES USING STRAIGHT
     LINE ="T(1)
437  PRINT "PRESENT VALUE OF TAXES USING DOUBLE
     DECLINING BALANCE="T(2)
438  PRINT
440  IF S(1) < S(2) THEN 460
445  PRINT "DOUBLE DECLINING BALANCE METHOD SAVES"
     S(1) - S(2) "DOLLARS."
450  GO TO 470
460  PRINT "STRAIGHT LINE METHOD SAVES"S(2) - S(1)
     "DOLLARS."
470  END


RUN


DEPRECIATION METHOD COMPARISON PROGRAM

    ESTIMATE YOUR INCOME, RATE OF GROWTH IN INCOME,
    AND YOUR RATE OF RETURN ON INVESTMENT.

ENTER ASSET COST?1200
ENTER SALVAGE VALUE?100
ENTER SERVICE LIFE OF ASSET?5
ENTER YOUR CURRENT INCOME LEVEL?15000
ENTER ESTIMATED INCOME GROWTH RATE?.2
ENTER YOUR RATE OF RETURN ON INVESTMENTS?.1



PRESENT VALUE OF TAXES USING STRAIGHT LINE = 19135.2
PRESENT VALUE OF TAXES USING DOUBLE DECLINING
BALANCE = 19147.4

STRAIGHT LINE METHOD SAVES 12.1973 DOLLARS.

READY
```

- an estimate of its trade-in value
- your current income level
- an estimate of the growth rate of your income over the useful life of your system
- an estimate of the rate of return you can make on your investment of the postponed taxes

Fortunately, these calculations are easily done on your computer with the BASIC program in listing 1. The program was written for use on my TRS-80 and makes the analysis of any depreciable asset painless. With luck, an analysis of your microcomputer system's depreciation should save you a few dollars.

The Program

This program uses the 1979 tax tables for joint tax returns. For a different tax status or year, you need only modify the DATA statements. A quick comparison of those statements with the table will show which numbers go where. The calculations involve the determination of taxable income, before depreciation, for each of the years over the life of the computer. That requires the use of the estimated income-growth rate which is supplied by the user.

Depreciation expense is calculated using each of two methods: straight-line and double-declining-balance with the switch-over. Annual depreciation amounts are subtracted from the respective annual taxable incomes and the tax calculated from the tax tables. These annual tax amounts are then discounted to the present and summed over the life of the system. A comparison of the two present values of taxes owed over the life of the system will indicate which method should be used.■

onEducation

Computer Science
at Narragansett Regional

Instructor Kevin Whittemore (standing) assisting second-year students who are having difficulty tracing a hardware bug. Since the boards have actual problems, anything or everything can be wrong with them, making debugging a real challenge at times. Before testing on a board begins, no one, not even the instructor, knows what problems will be encountered along the way.

"Uh, Mr Whittemore, I think I fried something." The sickly odor of burned silicon and plastic began to fill the classroom as smoke continued pouring from the computer on the student's workbench. Ordinarily, a mistake like this second-year student made would have caused the calmest teacher to scream or faint, since the burned parts represent hundreds of dollars. But Kevin Whittemore, instructor of "Computer Science and Technology (CS&T) I and II," was cool. "Go over to the spares box and find a board with the same IC you burned and fix your board," he said, never raising his voice, "Then let's figure out what you did wrong." Why is this teacher smiling instead of crying?

$$1 + 2 + 3 + 4 + 5 = 15$$

The fractions are formed by reversing the order of the digits and dividing each one by the sum. For the first year in the above example, depreciation would be $^5/_{15}$ of $2000 – $500, or $500; for the second year, it would be $^4/_{15}$ of $2000 – $500, or $400; and so on.

Which Method to Use

Many analysts will recommend an accelerated method over the straight-line method because it allows you to recover your capital outlay more quickly. This sounds good, but consider the effect of that depreciation on your income. Depreciation expense will reduce taxable income, and with it the taxes owed in a given year. Who does not want to save on taxes? As mentioned above, the amount which you can depreciate is the same regardless of the method used.

The choice of method essentially determines the distribution of the annual depreciation amounts over the life of the microcomputer system. If you use an accelerated method, you will be reducing taxable income by larger amounts in the early years. If you take more depreciation in the early years, you will be reducing taxable income by smaller amounts in later years than would be the case with straight-line. An analysis of whether to take the depreciation more rapidly in early years or to spread it evenly over the microcomputer's life involves several factors.

One thing we can expect for some time to come is persistent inflation. That means inflated incomes, deceptive as that may seem, along with inflated prices.

When you use an accelerated method you can postpone paying some tax.

As income rises, you will be forced into higher brackets in the tax tables. Each bracket carries a higher marginal tax rate. That is, the rate at which an extra dollar will be taxed increases. Looking at taxable income for each year during the life of your system, you would observe it to be lower in the early years and higher in the later years under the accelerated method. Obviously, taxes would also be lower in the early years and higher in the later years under the accelerated method. Essentially, when you use an accelerated method you can postpone paying some tax. If you invest that postponed tax, or just add it to your savings account, you can earn additional income during the early years and use it to help pay the additional tax during the later years.

This sounds very nice. In fact, it sounds like a tax shelter. Whether or not it *is* a tax shelter depends on what happens to your income during the life of your microcomputer system. If you expect your income to jump sharply over the life of your system, then you can look forward to the higher marginal tax rate mentioned earlier. The

marginal tax rate applies to the difference between taxable incomes figured using each of the two depreciation methods.

If your income climbs rapidly enough, the additional taxes owed during the later years under the accelerated method could be much higher than the taxes postponed in the early years, even if you include the return on the postponed taxes you invested. That is certainly no tax shelter!

Present Value Analysis

The wrong depreciation method can cost you dearly in hard-earned dollars. Any reputable financial advisor will suggest that you use *present value analysis* in making your decision. That form of analysis is based on the idea that a dollar today is worth more than a dollar tomorrow. You can invest today's dollar and with its earnings have more than a dollar tomorrow. So, to make the necessary comparisons of taxes owed at various times in the future, the dollar amounts must be related to the same time period, for example, the present.

When all dollar amounts are expressed as present values, direct comparisons are more meaningful. The process of converting the dollar amounts at particular points in time to equivalent present values is called *discounting*. An appropriate discount rate would be the rate of interest you earn on your investments.

Unfortunately, the present-value calculations needed to make the proper decision are not simple. They involve a number of factors:

- the cost of your personal-computer system
- an estimate of the useful life of your system

Listing 1: *On the basis of the cost of your computer, its estimated trade-in value and its anticipated service life, along with information about your income, this program calculates your taxes using the different methods of depreciation. As in the sample RUN, it then indicates which method will save money and the amount it will save you. This program is written in TRS-80 Level II BASIC.*

```
10   DIM M(16), N(16), L(16)
20   FOR I = 1 TO 16
30   READ M(I), N(I), L(I)
40   NEXT I
45   DATA 3400, 0, 0, 5500, 0, .14, 7600, 294, .16, 11900, 630,
     .18, 16000
46   DATA 1404, .21, 20200, 2265, .24, 24600, 3273, .28, 29900,
     4505, .32
47   DATA 35200, 6201, .37, 45800, 8162, .43, 60000, 12720, .49,
     85600
48   DATA 19678, .54, 109400, 33502, .59, 162400, 47544, .64,
     215400
49   DATA 814664, .68, 1000000, 117504, .7
50   CLS
60   PRINT "DEPRECIATION METHOD COMPARISON
     PROGRAM"
70   PRINT
80   PRINT "      ESTIMATE YOUR INCOME, RATE OF
     GROWTH IN INCOME,"
90   PRINT "      AND YOUR RATE OF RETURN ON
     INVESTMENT."
100  PRINT
110  PRINT "ENTER ASSET COST";
120  INPUT F
130  PRINT "ENTER SALVAGE VALUE";
140  INPUT S
150  PRINT "ENTER SERVICE LIFE OF ASSET";
155  INPUT N
160  PRINT "ENTER YOUR CURRENT INCOME LEVEL";
165  INPUT T0
170  PRINT "ENTER ESTIMATED INCOME GROWTH RATE";
180  INPUT G
190  PRINT "ENTER YOUR RATE OF RETURN ON
     INVESTMENTS";
200  INPUT R
210  PRINT
215  D1 = (F - S) / N
220  A = 0: Z = 0: S(1) = 0: S(2) = 0
230  FOR I = 1 TO N
240  D2 = (2/N) * (F - A)
250  IF Z = 1 THEN 280
260  Q = (F - S - A)/(N - I + 1)
270  IF D2>Q THEN 290
275  Z = 1
280  D2 = Q
290  IF D2 <=(F - S - A) THEN 310
300  D2 = F - S - A
```

and Technology

High School

by Blaise W Liffick

It's because he knows that when you teach a computer-hardware course in high school, you have to expect some "technical difficulties."

"The one thing you can't be afraid of is to let things go wrong," he later said. "It's part of the learning process. Every time a student makes a mistake, he learns how to fix the problem, and also learns what *not* to do. It also helps to have several boxes of spare parts on hand," he added with a knowing smile.

Kevin Whittemore started his hardware class at Narragansett Regional High School in Baldwinville, Massachusetts more than four years ago after attending summer classes sponsored by DEC (Digital Equipment Corporation). Since that time he has acquired an impressive array of equipment for his students through Department of Education grants and inventive scrounging:

- five DEC PDP-8/E minicomputers
- DECwriter II and DECwriter III printing terminals
- two DEC PDP-11/03 minicomputers
- hard- and floppy-disk drives
- DEC-format magnetic-tape drives
- cassette-tape drives
- a high-speed paper-tape reader/punch
- two Heathkit H11A microcomputer systems
- three Heathkit H8 microcomputer systems
- two Heathkit ET-3400 microprocessor trainers
- a variety of spare parts and test equipment (such as an oscilloscope)

However, the most impressive thing about the course is not the equipment at hand, but the students. They are eager to learn everything they can about computers, and it shows in their attentiveness and willingness to work hard on projects.

The class itself is set up as sort of an open lab. After introducing new concepts or identifying the day's working parameters, the class breaks up so that the new principles can be put into practice. The assignment might be to find out what a particular integrated circuit does by running some sample programs through it. Or, for the more advanced students, it might mean debugging the boards of one of the PDP-8s.

The overall course is structured on three levels, one year of study for each level. Its goal is to make it possible for students to get jobs as technicians when they graduate from high school. For those continuing on to college, it provides a head start in a very complex field, and allows them to advance more quickly in college. Either way, it means computer experience and a marketable background once in the job market.

The First Year

CS&T I covers the PDP-8/E. It starts with a general introduction to minicomputer architecture, progresses to integrated-circuit logic, and finally involves PDP-8/E machine-language programming. Since the course is intended for those interested in computer hardware, programming is kept to a minimum. By the end of this first year, students are expected to:

- understand and use common computer terminology
- build digital logic circuits and determine their logic functions (using the Heathkit microprocessor trainers)
- troubleshoot defective circuitry or components in integrated-circuit configurations
- write, debug, and document fourteen simple machine-language programs

The Second Year

Most students return for the second-year course, since it is here where they learn most about being a technician. This begins with learning proper soldering

techniques and assembly and handling of electronic components. Learning these things is quite important for potential technicians, since some components are sensitive to things such as static electricity (like that acquired by walking across a carpet when the air is dry). A poor solder connection can not only cause a device not to work, but can also destroy expensive circuitry.

Next, the students become familiar with a variety of test and diagnostic equipment, such as logic probes, logic monitors, and oscilloscopes. These devices are then used to diagnose various problems on the PDP-8s. Topics such as timing generators, major state registers, register controls, and bus structures are covered in detail, along with flowcharting and how to read schematic diagrams, to give the students the necessary background to diagnose problems.

Finally, the second-year students will build, debug, and program a Heathkit H8 microcomputer. So, by the time the second year is completed, the student has a firm understanding of assembling, maintaining, and debugging a variety of computer hardware, and has a brief introduction to programming.

The Third Year

Although not yet implemented, there is a third course in computer science and technology at Narragansett. Mr Whittemore hopes to introduce the course this fall. It will deal primarily with the DEC PDP-11 computer. The school has two types of this machine available in the form of two PDP-11/03s and two Heathkit H11A microcomputer systems (based on a DEC-supplied LSI-11 board).

There will be three parts to this course, beginning with an introduction to the general concepts of the system and the programming modes and instruction set of the PDP-11, and leading to the writing of small programs. The course will be supplemented with an audio-visual presentation available from the Digital Equipment Corporation.

Next, the students will be given the opportunity to troubleshoot, analyze, debug, and repair typical problems on the PDP-11 and its associated peripheral devices.

Finally, the students will learn advanced programming techniques, working with both higher- and lower-level programming languages. These techniques will be developed and implemented with the use of the RSX-11, OS/8, and HT-11 operating systems.

What Does It Take to Implement This Type of Program?

For all its fancy hardware, the careful planning of the courses, and the hard work of Kevin Whittemore, the class could hardly be as successful as it is without the continued support of both students and the school administration. From the student's side of things, more than three-fourths of them anticipate a career in computers. Many hope to become technicians when they graduate from high school, while others hope to pursue computer science or electrical engineering in college. After talking to graduates of the class who have gone in each direction, it becomes clear that both alternatives are viable for Mr Whittemore's students. Knowing that they are indeed building future careers, the students in Computer Science and Technology work hard to learn what Mr Whittemore can teach them.

As for the high school administration, they couldn't be happier. I happened to have lunch with the superintendent of the school, purely by accident, and we discussed Mr Whittemore's classes. It was clear that the superintendent is proud of Mr Whittemore's accomplishments. "This school district doesn't know what a tremendous resource it has in this fellow," he said. Obviously, someone does.

But what does it actually take to set up a series of courses like this? Well, obviously equipment, which can be translated into money. And a great deal of it. As noted earlier, Mr Whittemore obtained a grant of $24,000 to buy equipment. There are in fact many kinds of grants available from state and federal government agencies such as the Department of Education. There is also some private funding available from industry sources such as the Apple Education Foundation. It may take some time to sort through all of the possibilities for funding, but it would be well worth it in the long run.

Obviously, it takes a commitment from the school administration to even allow a course like this to be developed and implemented. School officials who oppose such programs point out that they have enough trouble just staying on top of the courses they already have. They cite a lack of enough time or money to implement new "exotic" courses, and claim that it is really college-level stuff anyway. What they fail

to realize is that many students could have a successful career in computing without going to college, if given the right opportunities. And opportunities are made, they don't just happen. In this high-technology age, anyone without some knowledge of computers is at a distinct disadvantage. Shouldn't an educational system serve the needs of the community by offering relevant career education?

Finally, a course like this takes an extremely dedicated teacher to develop and implement. In this case, there is Kevin Whittemore. He spends a lot of extra time acquiring equipment, attending computer seminars and meetings, and attending workshops and classes, all on his own time. For the past four years, he has spent his summers attending classes sponsored by computer companies, unpaid. It isn't easy, either for him or his family, but he recognizes the importance of what he does and he enjoys it. I hope that, some day soon, this type of total commitment will not be required to make a program like this available to high school students.

There are a number of things unique about this series of courses. First, instead of taking the software-oriented approach of most school systems, these computer courses are slanted toward hardware. Second, being hardware courses, they not only teach how things operate when they work correctly, but also what happens when things go wrong. Finally, this program makes effective use of what some would consider obsolete equipment, and provides students with the basic knowledge they need to find good jobs in a highly technical field.■

newProducts

Conducted by Charles Freiberg

These pages are designed to keep our readers in touch with the marketplace. The material which appears here is obtained from manufacturers and is not to be taken as an endorsement by onComputing. We invite manufacturers to submit material and we publish the information we feel will be of interest to our readers.

Floppy Disks and Magnetic Cards from KYBE

Dennison KYBE Corp, 132 Calvary St, Waltham MA 02154, (617) 899-0012, has announced a line of 100 percent error-free 8- and 5-inch floppy disks and magnetic cards. The storage units are rated to handle more than twelve million passes without media-related errors or significant wear. The prices for the 8-inch disks start at $2.75. The 5-inch disks are priced from $2.60, and IBM-compatible magnetic cards are priced from $7 per box of twenty-five.

Circle 251 on inquiry card.

Speech Circuits Offered by Texas Instruments

The TMS5000 speech-processing integrated circuits provide 100 words of synthetic speech (100 seconds) and are in the $13 price range in production quantities. Speech encoding on the TMS5100 speech synthesis circuit is achieved through pitch-excited Linear Predictive Coding (LPC). LPC is based on a linear equation to formulate a mathematical model of the human vocal tract and an ability to predict a speech sample based on previous ones. Codes for twelve synthesis parameters serve as inputs to the synthesizer device. Inputs to the digital filter take two forms: periodic and random. The periodic inputs are used to reproduce voiced sounds that have a definite pitch, such as vowel sounds or voiced fricatives such as Z, B, or D. A random input models fricative sounds such as S, F, T, and SH. Output of the filter drives a converter, which in turn drives a speaker. The circuit can generate up to 10,000 speech samples per second. Contact Texas Instruments Inc, Inquiry Answering Service, POB 1443, M/S 653, Houston TX 77001.

Circle 252 on inquiry card.

Computer Flash Cards Help Students Learn About BASIC

Micronotions, 1929 Northport Dr, Room 6, Madison WI 53704, has released a set of Atari BASIC Cards similar to "flash" cards. Each BASIC keyword has its own card, illustrating its correct syntax, briefly explaining its use, showing an example of it in use, and cross-referencing related cards. The eighty-eight cards are arranged alphabetically in booklet form. These cards were designed especially for students using the Atari computer. The price for the cards is $5.

Circle 253 on inquiry card.

Lowercase and Graphic-Symbols Generator for the TRS-80

The CG-16 lowercase and graphic-symbols generator displays 192 ASCII characters and graphic symbols, plus 64 TRS-80 graphic characters. It provides lowercase characters with descenders for word processing and works with the Electric Pencil and Scripsit. It generates electronics symbols, game symbols, thin-line graphics, and half-tone-like characters. This modification is compatible with all disk operating systems, Level II and Disk BASIC, and non-Radio Shack programs. All existing programs will run and display properly without software changes. The modification requires soldering of jumpers and cutting of traces on the circuit board. The price for the CG-16 is $94.50 from G P Associates, POB 22822, Sacramento CA 95822.

Circle 254 on inquiry card.

Ribbons for Centronics Printers

Gem Business Systems Ltd, 60 E 42 St, Suite 1027, New York NY 10017, (212) 682-9005, is marketing the Zip-Box Ribbon for the Centronics 700 Series printer. The ribbons are available with medium inking for high print quality and long life.

Circle 256 on inquiry card.

Real Estate Index and Locator (REILEY)

REILEY is a group of BASIC programs designed to help real estate agencies find properties for customers. These search and sort programs match the home specifications of a prospective buyer with current MLS listings. In addition, REILEY can give comparisons of mortgage terms, access property descriptions, print amortization tables, estimate the monthly payment and sale price which the buyer can afford, and determine the replacement price of any home in the MLS file. REILEY can be used by real estate agents with no computer training. It is available for North Star disk systems. A single-drive, single-density system with 24 K bytes of programmable memory is the minimum requirement. Up to 4400 listings can be stored on single-density disks. On a 4 MHz Z80 system with 1000 active MLS listings, REILEY takes about 1.5 minutes to find listings that match a set of given specifications. REILEY is also available in Applesoft BASIC, CBASIC-2, Radio Shack BASIC, and IBM 5100 BASIC. REILEY is sold in retail computer stores and systems houses only. It is a product of The Electric Abacus, 19 Mayfield Rd, Regina Saskatchewan S4V 0B7, Canada.

Circle 257 on inquiry card.

A Printer from Matchless

The MS-204 printer is compatible with the TRS-80, Apple, PET, or any other Centronics-type system. This 132-column, bidirectional, 9-by-7 dot-matrix printer has a print head life of 100 million characters. Among the features are a print speed of 125 characters per second and throughput print speed of 63 lines per minute. The adjustable sprocket-feed mechanism allows the use of forms from 6.4 thru 24 cm (2.5 thru 9.5 inches) wide, with loading from either the bottom or rear. Upper and lowercase characters are provided. The printer provides preprogrammed/programmable tab positions, as well as top-of-form and bottom-of-form functions. The retail price is $795 from Matchless Systems, 18444 Broadway, Gardena CA 90248, (213) 327-1010.

Circle 258 on inquiry card.

Program Control Software for the Apple II

Full control of the running of Apple II programs is now available through the Video/Print/List Controller by Howard Software Services, 7722 Hosford Ave, Los Angeles CA 90045. The controls are activated by keyboard commands, providing control of running and listing speed, listing format, line-printer action, and cursor movement. Features include suspend/resume via space bar, variable speed via paddle, vertical colon alignment, instant printer on/off during running, and several other program control features. The program is compatible with Apple II and Apple II Plus personal computers, and will work with Integer BASIC, Applesoft, and assembly languages as well as the Apple Monitor. It is available on disk or tape for $39.

Circle 259 on inquiry card.

newProducts

Check Register Accounting System

The Bottom Shelf Inc, POB 49104, Atlanta GA 30359, (404) 491-7567, has released the Check Register Accounting System for the TRS-80. The program balances and reconciles checkbooks, defines up to sixty account names, and generates monthly summaries of all accounts with month- and year-to-date totals. Single entry input allows the user to disperse one transaction over several accounts and to make a 64-character note for each transaction. The system generates reports on check registers for any month, income/expense distribution, statement of selected accounts, bank reconcile statements, and more. It requires 32 K bytes of programmable memory, dual-disk drives, and a printer. The price is $49.50.

Circle 261 on inquiry card.

Sourcebook for Educators

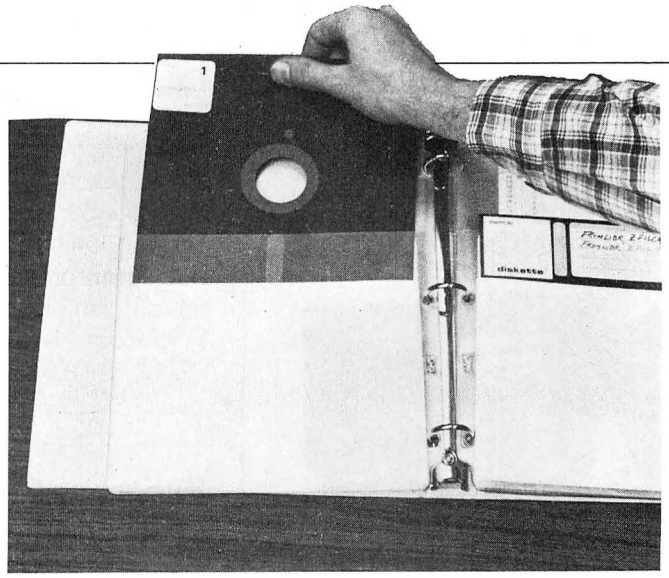
Now available from Radio Shack is the TRS-80 Microcomputer Sourcebook for Educators, a guide to the use of microcomputers in the classroom, and as a tool for school administrators. The booklet offers guidelines for selecting personal computers based on potential applications, costs, services, reliability, and courseware. It is available free from Radio Shack, Dept NR-17, 1300 One Tandy Center, Fort Worth TX 76102, (817) 390-3272.

Circle 262 on inquiry card.

Direct-Connect Modem for Multi- or Single-Line Phones

The D-CAT is an FCC-approved Bell 103 compatible modem that can function on either a multi- or single-line phone. It works with a single-line phone or 50-pin, 6-line business phones. The modem offers full duplex capability and a voice/data monitor, a hold function, privacy button, and a self-test feature. The unit has a mode switch to allow the user to monitor whether voice or data is being transmitted. The D-CAT is priced at $199 from Novation, 18664 Oxnard St, Tarzana CA 91356.

Circle 263 on inquiry card.



The Flex-File System

The Flex-File is a nonglare vinyl page with pockets on each side to house two 8-inch floppy disks, plus a center pocket to store 22- by 28-cm (8.5- by 11-inch) paper, computer printouts, or other documentation. The pages are three-hole punched for storage in standard three-ring binders. Flex-File pages are priced at $8.95 for a package of ten pages, and are available from BIS Inc, POB 969, Brentwood TN 37027.

Circle 264 on inquiry card.

Accounts-Receivable Program for the TRS-80

Radio Shack has announced an accounts-receivable system for use on the TRS-80 Model I personal computer. The program provides end-of-month billing, statements ready for mailing, automatic customer-record updating, totals for general-ledger posting, optional message lines on billing statements, full accounts-receivable analysis including activity status, and more. Reports that can be printed by this system include a complete transaction file report, general ledger recap report, complete account listing, account listing by activity status, accounts-receivable analysis by activity status, and a posting report. The program requires a Model I Level II computer with 16 K bytes of programmable memory, an expansion interface with at least 16 K bytes of programmable memory, an 80-column printer, and a minimum of two disk drives. The accounts-receivable system is priced at $149.95 from Radio Shack dealers and stores.

Circle 266 on inquiry card.

Apple Introduces the Apple III

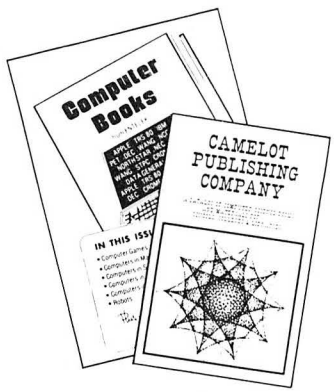
The Apple III is a computer system with a built-in five-inch floppy-disk drive, up to 128 K bytes of memory, and color or black-and-white video display (depending on the system). The Apple III uses a 6502A microprocessor that is faster than the 6502 used in the Apple II and can address up to 128 K bytes of memory. A 6-bit digital-to-analog converter is included. Peripherals request machine attention by interrupting the microprocessor, which optimizes speed. Alternatively, the microprocessor may poll peripherals to see which need attention, thus minimizing the software required for peripheral control. Options for the system include up to 32 K bytes of additional programmable memory; additional five-inch floppy-disk drives (up to a maximum of four per system); either the Silentype or a letter-quality printer; the use of a standard color video monitor, an RGB color monitor, or a standard TV set; and input/output printed-circuit cards for interfacing other peripheral devices. Two new application packages are offered for use on the Apple III. The Information Analyst software is used for planning, forecasting, modeling, pricing and costing, scheduling, and budgeting. It requires 96 K bytes of memory, includes Apple's SOS (Sophisticated Operating System), and costs $4340, including the Apple III. The Apple III Word Processor software is used for preparing memos, letters and general typing, long documents, form letters, and legal documents. It comes with an Apple Silentype thermal printer ($5330 for the entire system) or a letter-quality printer ($7800 for the entire system). The SOS ties together the hardware and software features of the Apple III and contains a file system, device module, event management interface, and a memory management system. For more information, contact Apple Computer Inc, 10260 Bandley Dr, Cupertino CA 95014, (408) 996-1010.

Circle 267 on inquiry card.

Fantasy Software for the PET, TRS-80, and Apple II

Automated Simulations is offering fantasy games with wizards, magic paraphernalia, monsters, and adventures for TRS-80, Apple II, and PET computers. Morloc's Tower and the Datestones of Rhyn are two of the games designed for the PET with at least 20 K bytes of memory, the TRS-80 Model II with 16 K bytes, and the Apple II with 32 K bytes and Applesoft in read-only memory (ROM). The games are all priced at $14.95. Contact Automated Simulations, POB 4232, Mountain View CA 94040, (415) 964-8021.

Circle 268 on inquiry card.



Camelot Catalog of Computer Books

A catalog of computer science books, materials, and teaching aids has recently been issued by Camelot Publishing Company, POB 1357, Ormond Beach FL 32074. Over fifty items are described for use by teachers, students, and people interested in computers. The catalog is free upon request.

Circle 269 on inquiry card.

newProducts

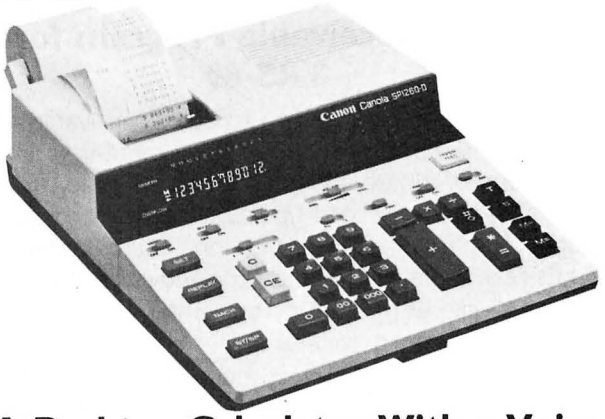
Computer Book Catalog

This free catalog describes eighty computer books. The books cover such topics as: computers in mathematics, science, music, law, business, education or society; computer languages, including BASIC, FORTRAN, APL and Pascal; machine, assembly, graphics, and simulation languages; and so on. The catalog is of particular value to schools, colleges, and libraries. Write to Entelek, Ward-Whidden House/The Hill, POB 1303, Portsmouth NH 03801. Circle 271 on inquiry card.

Gin Rummy Program Plays Expert-Level Game

Gin Rummy 2.0 from Manhattan Software plays a top-level game, remembering opponent's plays and adjusting its own strategy in response. It plays a regulation game and keeps score on a game level and on a carry-over level. The program constantly evaluates its hand according to cards drawn and thrown. When it is near the "knocking" level, it changes strategy and works toward knocking with ten points or less. Possible layoffs by the program are examined and made if appropriate, and player layoffs are allowed. The program is designed for the Radio Shack TRS-80 personal computer with 16 K bytes of memory. The price is $14.95. For details, contact Manhattan Software, POB 5200, Grand Central Station, New York NY 10017, (212) 427-4718.

Circle 272 on inquiry card.



A Desktop Calculator With a Voice

The Model SP1260-D, a talking calculator from Canon, is expected to be used in general business offices, banks, brokerage houses, schools, hospitals, and factories. The unit's speech synthesizer is used when the operator wants to check entries on the roll paper. The voice feature eliminates the need for two employees to check lists of numbers. The calculator can be operated in the voice mode or silently. The calculator can store up to 128 items of data, including the final result of the input. The SP1260-D incorporates the voice feature, a 12-digit capacity, memory for accumulating results, item counting, decimal point selection, and more, for $399. Contact Canon Calculator Division, Canon USA Inc, 10 Nevada Dr, Lake Success NY 11042.

Circle 273 on inquiry card.

Office Computer Under $5000

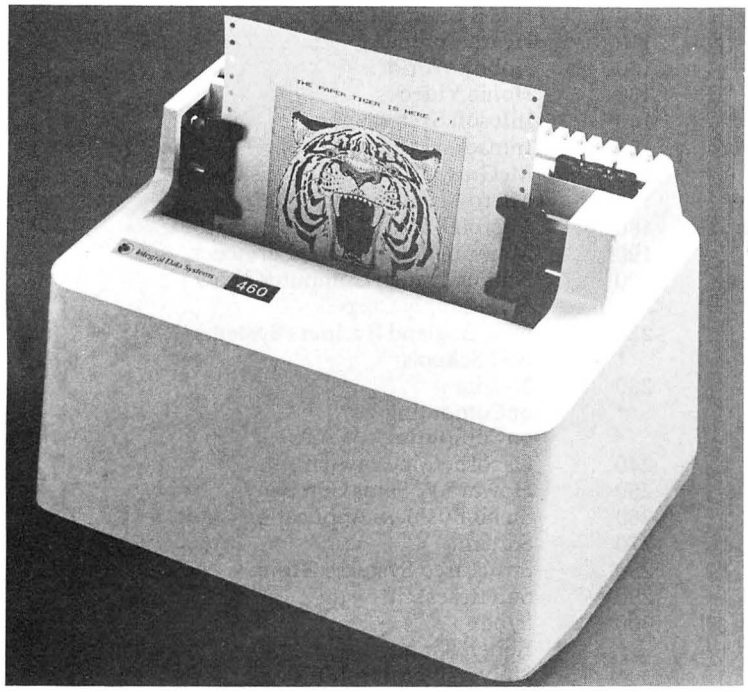
The ALPHAsprint system includes 64 K bytes of programmable memory, a 45 K-byte display buffer, high-resolution 12-inch video display, and two double-density, 5-inch floppy-disk drives capable of storing 330 K bytes of data. A Selectric II-type keyboard incorporates 72 character and function keys, and a full numeric keypad. The optional 660 word-per-minute letter-quality printer can be shared by up to three ALPHAsprints. Word-processing functions are oriented toward long document preparation. Other standard features include multispeed unlimited bidirectional scrolling, eight cursor commands, and intercharacter right justification. Printing functions are under program control. Editing can occur in the foreground while other documents are being printed in the background. Automatic centering, boldface, underline, auto-pagination, and repagination are standard. Applications software and CP/M, BASIC, FORTRAN, COBOL, and Pascal are available. The single quantity price for the ALPHAsprint is $4990 from Alpha Professional Systems Inc, 9465 Wilshire Blvd, Suite 518, Beverly Hills CA 90212, (213) 272-3032.

Circle 274 on inquiry card.

Peelings for Your Apple?

A new publication called *Peelings* is devoted exclusively to reviews of software for the Apple II and Apple II Plus personal computers. Each bimonthly issue contains reviews of from twelve to fifteen programs or software packages. Subscriptions are $15 from Peelings, Ed Burlbaw, 945 Brook Cir, Las Cruces NM 88001, (505) 523-5088.

Circle 276 on inquiry card.



Model 460 Paper Tiger Printer from IDS

The Model 460 printer, the latest addition to the IDS Paper Tiger printer family, produces letter-quality printing at a speed of 160 characters per second. It also provides high-resolution graphics capability and includes proportional character spacing and automatic text justification. The Model 460 is a dot-matrix printer that uses a horizontal and vertical dot overlay to achieve letter-quality printing. It can print in 80-, 96-, and 132-column formats. Foreign and custom character sets are optional, and up to four 96-character sets can reside in the 460 at the same time. Paper handling features include pin-feed tractor drives. A built-in microprocessor automatically tests the printer's memory and electronics every time the power is turned on. A 2 K-byte buffer allows the Model 460 to accept the contents of a 1920-character video screen. The 460 has a standard RS-232C serial interface as well as a Centronics-compatible parallel interface. Serial transmission rates from 110 thru 9600 bits per second are switch-selectable. The Model 460 costs $1295 and is available from Integral Data Systems, 14 Tech Cir, Natick MA 01760, (617) 237-7610.

Circle 277 on inquiry card.

Dungeons for OSI Microcomputers

Dungeons is a fantasy adventure program for OSI personal computers. Players can be fighters, dwarfs, halflings, elves, or magic-users in a search for gold in the dungeons beneath the Wizard's city or in the forest that surrounds the city. Dungeons is based on Dungeons and Dragons, a fantasy game in which the computer plays the part of the Dungeon master. The price is $12.95 for cassette and $15.95 for five- and eight-inch floppy disks. Both versions require 8 K bytes of programmable memory. Contact Aurora Software Associates, 353 S 100 E #6, Springville UT 84663, (801) 533-8002.

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Programs for Home Control

A set of new programs from Soft-Sonic enables you to control appliances and other electrical devices in your home using a personal computer. They run on the Apple microcomputer in conjunction with a BSR Ultrasonic System 10-X (Sears Home Controller). The package includes the transducer hardware, interface cable, and the programs on a floppy disk. The programs control electrical devices either by means of user-defined timed sequences, or by voice command using the Heuristics Speech Labs speech synthesizer. The program, priced at $39.95, is available from John Blankenship, BACE, POB 52785, Atlanta GA 30355.

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Coming up in the Winter onComputing:

Small-Business Software: Reviews of Accounts Receivable, General Ledger, and other accounting software.

Computer Toys and Games for 1981

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A Simple Educational Program in BASIC

InterAction Results

The winning articles for the Summer 1980 onComputing were "Word Processors: A Look at Four Popular Programs" by Larry Press and "Living with Computers" by Jerry Pournelle. Larry and Jerry won first and second prizes of $100 and $50, respectively.

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13	33	53	73	93	113	133	153	173	193	213	233	253	273	293
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16	36	56	76	96	116	136	156	176	196	216	236	256	276	286
17	37	57	77	97	117	137	157	177	197	217	237	257	277	297
18	38	58	78	98	118	138	158	178	198	218	238	258	278	298
19	39	59	79	99	119	139	159	179	199	219	239	259	279	299
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